University of Minn
Library
Minneapolis Minn

RECEIVED JUL 26 1937 UNIVERSITY OF MINNESOTA LIBRARY

Grounded in Tradition

surpassing all records for durability, poles of

Northern White Cedar

continue to serve you best. For genuine economy use these good poles always . . . our *poles with character* . . .

TREATED OR PLAIN

MICHIGAN POLE & TIE CO.

Northern and Western Poles

Newberry, Mich. • Grand Rapids, Mich.

Strategically Located Yards
Quick Shipping Service

Immediate Shipment from Stock

REPUBLIC PINE POLES

Scientifically treated with Reilly's Improved Creosote Oil

REPUBLIC CREOSOTING CO.
Indianapolis, Ind.

PLANTS—Mobile, Ala.; St. Louis Park, Minn.; Indianapolis, Ind.; Norfolk, Va.; Joppa, Ill.

Entirely NEW in Telephony!

VINCENT
RARE GAS RELAY

Improves Ringing and Transmission on Party Lines Used with Either Coded or Harmonic Bells. Low Cost. Installed with a Single Screw.

Its Many Advantages Are Shown in Our Descriptive Folder RTC-1

World's Largest Makers of Antenna Systems

L. S. BRACH Mfg. Corp.

Newark, N. J. BRACH Est. 1906

Makers of Rare Gas Arresters, Test-O-Lite, Etc., for 30 Years

They WON'T PULL OUT!

Once the Conductors Are Pressed into the NICOPRESS SLEEVE They WILL NOT PULL OUT—

Test after test has proven that the Line Joint made with a NICOPRESS SLEEVE has maximum strength. When the hard metal alloy with which the sleeve is lined has been pressed into the softer metal of the sleeve and conductors, the conductors cannot pull out. Besides, National Nicopress joints are easy to make. Write for details and prices.

THE NATIONAL TELEPHONE SUPPLY COMPANY
5100 Superior Ave. Cleveland, Ohio

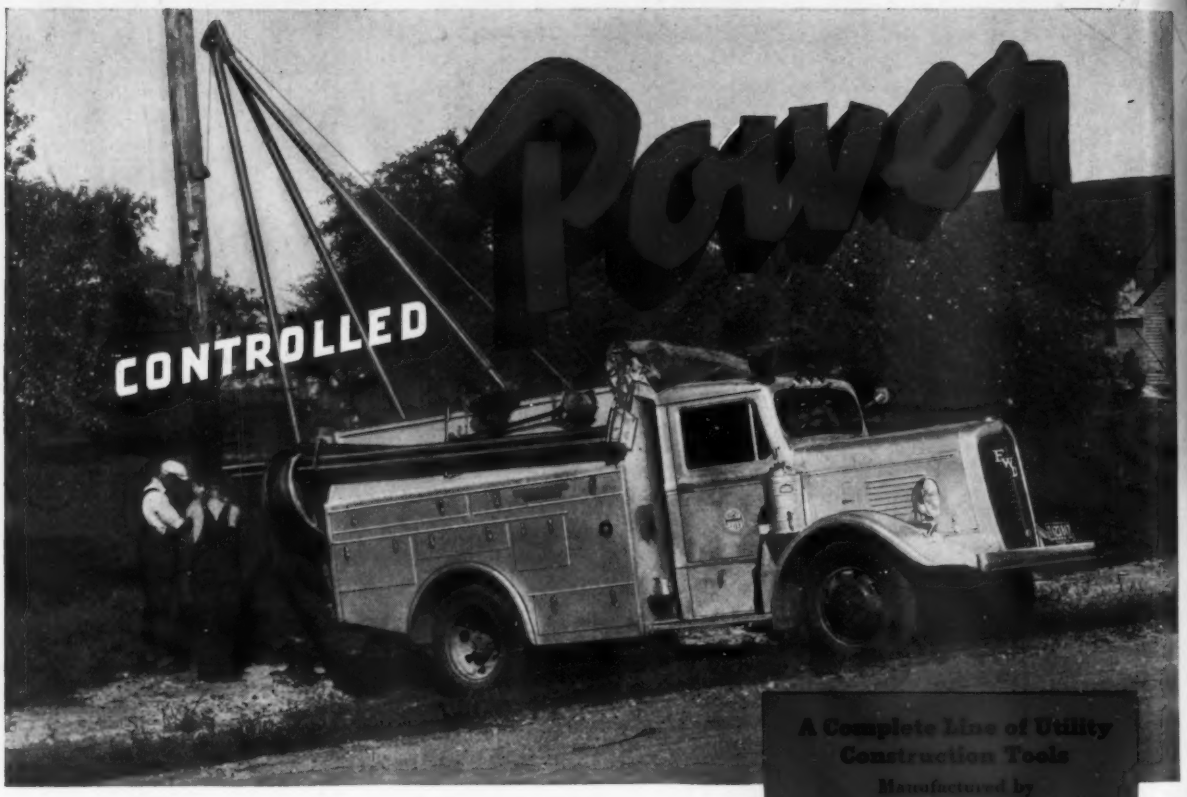
MAKE IT A NATIONAL

J. W. WOPAT

Consulting Engineer

Telephone Engineering
Construction Supervision
Appraisals—Financial
Rate Investigations

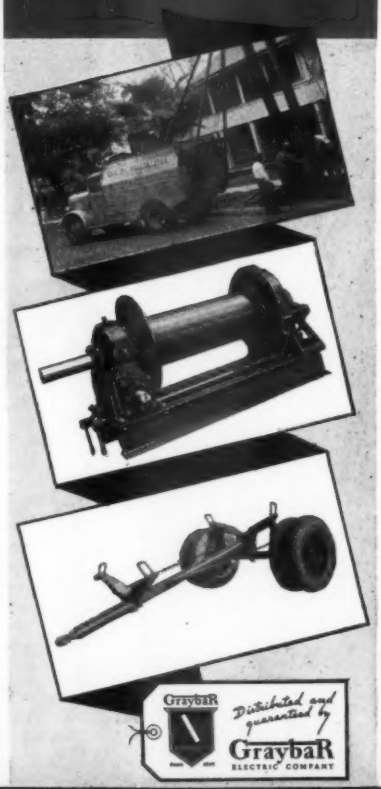
303 East Berry Street,
Fort Wayne, Indiana



Gives the FWD Truck Sure-footing Under All Road Conditions . . . .

The FWD Truck will perform dependably and economically for you . . . Its four-wheel-drive principle, that of power and load distribution, gives it positive traction in mud, sand, loose soils, snow and on slippery pavements. In the construction of the FWD, a center differential is used to distribute the power equally to the four driving wheels . . . Its reserve power, rugged construction throughout, and true application of the four-wheel-drive principle, insure continuous operation under any conditions. You'll find speed, safety, dependability, economy, and unmatched performance in the FWD — the pioneer of four-wheel-drive trucks . . . Let us give you the details of FWD Controlled Power.

A Complete Line of Utility Construction Tools
Manufactured by
the Utility Division of
The Four Wheel Drive Auto Co.



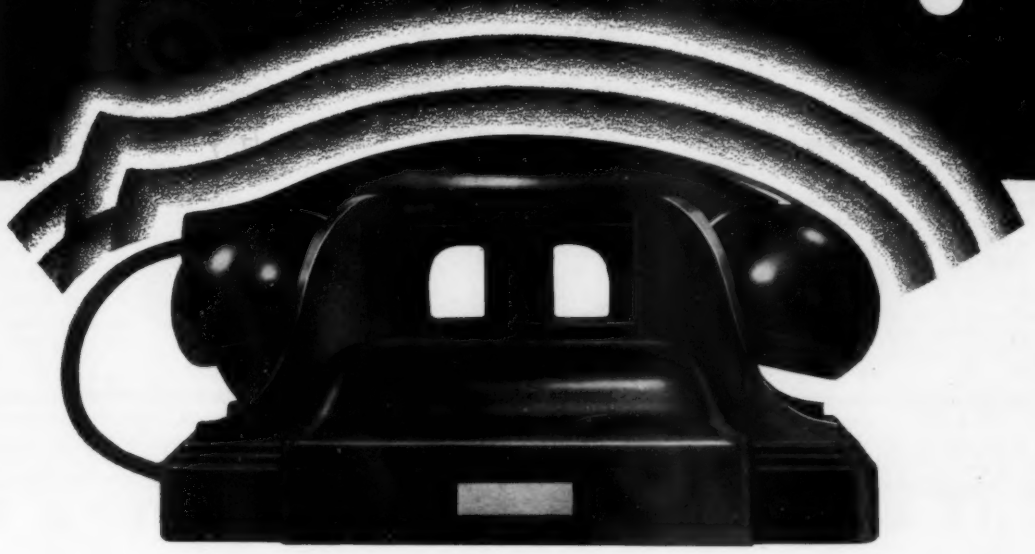
THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
Canadian Factory, **KITCHENER, ONTARIO**

FWD FOUR-WHEEL-DRIVE TRUCKS

THE SAFEST TRUCK ON THE HIGHWAY

TELEPHONY, July 24, 1937. Volume 113. No. 4. Published every week on Saturday by TELEPHONY PUBLISHING CORPORATION, 608 So. Dearborn St., Chicago, Ill. Telephone Wabash 8604. Subscription, $3.00 per year. Entered as second class matter September 4, 1908, at the Post Office at Chicago, Ill., under the act of March 3, 1879.

to hold in ONE HAND!



From the standpoint of design, all of the new Kellogg Masterphones are beautiful, small, modern and graceful. They all have the same transmission, reception and ringing. Most of the parts are interchangeable in these new Combination desk sets, new wall sets and the new, small, all-Bakelite desk set boxes. Then too, the NON-POSITIONAL transmitter is the standard transmitter in all Kellogg Masterphones today, and like the TRIAD circuit, comes to you without extra cost.

KELLOGG SWITCHBOARD & SUPPLY CO.
1066 WEST ADAMS STREET CHICAGO, ILLINOIS

KELLOGG Masterphone

6 POINTS OF SUPERIORITY IN THESE NEW LENZ TELEPHONE CORDS

1 NEW CELLULOSE ACETATE INSULATION
With improved moisture-resisting and body-acid resisting qualities. Its improved insulation resistance minimizes possibilities of electrical leakage.

2 MAXIMUM FLEXIBILITY
Cords of three conductors or more are twisted together so as to give maximum flexibility, uniformity and less liable to kink.

3 LONG WEARING OUTER BRAID
The finest wear resisting textile available is used in outer braid, assuring long life.

4 BRONZE ALLOY CONDUCTORS
The Double Wrapped Conductor Ribbon is Bronze Alloy, selected for its greater physical strength and ability to withstand hard usage without breaking.

5 MOISTURE-PROOF IMPREGNATION
The CELLULOSE ACETATE insulation is impregnated with a special non-corrosive moisture-proof compound providing additional protection against electrical leakage.

6 SUPERIOR WORKMANSHIP
Each cord is manufactured in accordance to the highest standards of workmanship, and thoroughly tested.

SEND FOR SAMPLE CORD TODAY!
We will gladly submit sample Lenz Telephone Cord for your personal inspection.

HAVE YOU RECEIVED YOUR FREE LENZ CORD CHART?
For all types of switchboards and instruments. FREE to Telephone engineers and managers!

LENZ ELECTRIC MANUFACTURING CO.
1751 NORTH WESTERN AVENUE • • ESTABLISHED 1904 • • CHICAGO, ILLINOIS

Telephony

A Journal Of Progress and Developments In The Telephone Industry

JULY 24, 1937 Vol. 113. No. 4

CONTENTS

Don't Scare People Away From Accounting 7
JAMES D. CLAYTON

Spare Minutes 9
ANNE BARNES

"Invisibility" of Telephoning Shown at Exposition 10

In the Nation's Capital 11
FRANCIS X. WELCH

Mathematics for Telephone Engineers (article eight, section 1) . 13
H. H. HARRISON

The Operators' Corner 16
MAYME WORKMAN

"Telephony's" Engineering Data 30
B. C. BURDEN

Personal Notes About Telephone Men 20
Here and There in the Field 24
Commission and Court Activities 27
Coming Conventions 29
Condensed Telephone News 33

PUBLISHED WEEKLY

BY TELEPHONY PUBLISHING CORPORATION

608 S. Dearborn Street, CHICAGO

Telephone Wabash 8604

H. D. FARGO, PRESIDENT AND TREASURER
S. R. EDWARDS, EDITOR AND SECRETARY
H. D. FARGO, JR., VICE-PRESIDENT AND ADVERTISING MANAGER
D. C. SORENSEN, WESTERN ADVERTISING MANAGER

Subscription — 10 Cents a Copy
$3 a Year U. S., Cuba and Mexico
$4 Canada, $5 Other Countries

Telephony

JULY 24, 1937 VOLUME 113, NUMBER 4

DON'T SCARE PEOPLE AWAY FROM ACCOUNTING

ACCOUNTING IS NOT mysterious bugaboo. Same common sense used in keeping records of individual's personal affairs is applied in setting up accounting records of a telephone company. Accurate primary records essential to good accounting. Set up records that will fit the business, giving information needed by management with least delay and effort. Address given at Oklahoma convention

By JAMES D. CLAYTON

Results Accountant,
Southwestern Bell Telephone Co.,
Oklahoma City, Okla.

THE IDEA that accounting or proper keeping of records is a matter that would require a knowledge of several books has, in my opinion, been a factor which has often discouraged giving some serious thought to the subject by those who have no intention of making it their lifework. I do not agree with such a viewpoint.

That is, I think it is a mistake to hold accounting up as something mysterious, and as something that involves an endless devotion to detailed work. We should not scare people away from the idea of keeping records and properly accounting for business transactions.

We can all add and subtract, and we all have some definite ideas as to logical divisions or classifications of what we spend and what we make. Take the case of a man who is on a salary basis: You will find that he knows about what he can pay for rent, what he must allow for groceries, clothes, car expense and replacement and other things. He does not have to read book after book to know that his automobile will wear out, that his clothes will wear out; in fact, that he himself will wear out.

So, if he is at all a level-headed sort of individual, he makes provisions for taking care of those things that wear out. He sets aside as much of his income as needed for clothes, replacement of automobile and home and to take care of his old age—and his Uncle Sam helps him here.

Well, there you have some idea of accounting and the records that might be set up for the practical application of the principles of taking proper care of income and expense and setting money aside for deferred use. Nothing to be scared of there—you apply the thought and so do I. Maybe some keep better records of their personal affairs than others, but we are all thinking about it.

And we are all thinking about our business the same way. What we want is a working practice to apply to keeping adequate records to insure that the results of the business activities can be shown correctly. In that, we should not let the thought of volume of accounting books discourage us. All we want is a set of records for the particular business in which we are engaged—not a lot of theories about records for all business.

I think it is agreed that we are going to keep records, aside from the fact that reports to regulatory bodies require it. And regardless of what the various writers say about why records should be kept, I think I can tell you the one reason.

There isn't a man among us who has a memory good enough to make it possible for him to tell the exact facts relating to his business or even what he himself does after a very short period of time. So there just isn't anything left for him to do—if he is a business man—but to set down on a piece of paper, a day-book, diary or something, a report of his business activities. There is the answer as to why records are kept.

Since we are going to keep records, why not keep *good* records—in fact, aim at keeping the best records that can be kept, yet retaining simplicity of methods and practices.

And by keeping good records we should keep in mind the records other than the ledger, journal entries, balance sheets and reports in the accounting office which are prepared by the bookkeeper. Those records might be a thing of beauty, checked, balanced, correct as far as transcription of entries is concerned and still be only 80 per cent correct. Well then, what's wrong?

I'll tell you what may be wrong. It may be that we do not give proper significance to the fact that practically every activity, irrespective of by whom performed or in what department, results in a financial transaction for which an accounting is required.

So it may be that during the day an employe who installed a couple of telephones, removed some left-in equipment, repaired a break in a circuit, repaired a couple of telephones and did a number of other jobs, waited until the end of the day to code his work report, account for the material he used during the day or classify other expenses over which he has control.

If he does that, you may be lucky if the reporting is 80 per cent correct; and, of course, your records are no more correct than the primary reports. Here again you run into what tricks your memory will play on you. Try this sometime—During the day keep an accurate record of the time you devote to your various jobs.

Put your record in your desk without reviewing it and then, when you have read the evening paper, prepare an independent time study of your activities for the day. Next morning at the office compare your two records. I think you will be surprised.

Failure to Make Correct Reports Cause Trouble

We wouldn't think of guessing at the time a customer spent on a long distance call; nor of approximating the date that a customer's telephone was put in service or disconnected; nor of estimating how much we owe the bank, nor of a lot of other things. If we did, we would get into serious difficulties in short order. Well, failure to correctly report and account for time worked, material used and other expenses is just as serious, although not so obvious and the difficulties may be postponed.

But you can rest assured that slipshod methods of reporting and keeping records of accounts chargeable with various expenditures will eventually cause a lot of trouble. Conversely, conscientious preparation of reports and keeping of records will help to keep us out of trouble.

In fact, keeping good accounting records will do more. It will give us a sense of satisfaction and pride in being able to tell just how the business stands. Good records will make for customer satisfaction and the satisfaction of you who are the owners or managers.

Accurate Records Aid in Handling Customers

It should not be necessary for me to emphasize to you the value of customer satisfaction. But suppose customers are always calling in complaining about incorrect bills and a check-up indicates that such complaint is justified. You can bet that such complaints are going to cause a lot of trouble.

In any business, customer satisfaction is vital. And if we can keep the customer satisfied, from the standpoint of accuracy of records so that invariably we can prove to his satisfaction that our records are right, then we have contributed a lot to the cause.

We may say that regulatory bodies require that we keep records which pretty well analyze the transactions of the business. The thought that I want to leave is that there is a lot of difference between keeping up work that is required and keeping such records in a way that will be a constant source of satisfaction every time a question comes up that can't be answered except by referring to records.

Undoubtedly, you have all been through experiences which required going back to the detailed records to answer certain questions or satisfy some customer, examiner, auditor or others. And if what you wanted wasn't readily available, easily obtained, complete and logically arranged, the air was probably somewhat blue for a few minutes—or would have been if your thoughts had been attached to a loudspeaker.

That's what I'm thinking about when I keep on talking about the need for good records. It isn't necessary that the records be elaborate. Of course, the larger the business the more complex the records and reports become, because of the wider scope and greater number of transactions. But we shouldn't let the thought of cost of keeping high-class records keep us away from an honest endeavor in that direction. Common sense and a good understanding of what is the need should govern.

It's possible to have so many records that you would be falling over them trying to get something you want. For example, I know a man who has a business employing about six people and he has a set of books which keeps him and clerk busy at their desks all day long. The result is that the supervision of his business is poor. There is a case of the wrong kind of records, probably too elaborate or too detailed or the wrong system. And it has resulted in the tail wagging the dog.

It was never intended that the business be set up to fit an accounting system. What the records and accounts should be is to perform a valuable service in furnishing accurate information to be used in the management of the business in the manner most satisfactory for all concerned. That is no small job and should not be considered too lightly.

Adequate, Neat, Complete and Correct Records

Whether the accounting records involve only a few sheets of columnar ruled paper—and columnar ruled paper is a godsend in record keeping—or volumes of books and reports with hundreds in the accounting department, the aim should be the same. That aim should be adequate, neat, complete and correct records without a lot of excess data for which no one has any use.

Whether the business is a peanut stand, restaurant, telephone exchange or steel mill, there are certain fundamental accounts that should be kept. Roughly, these may be divided into asset, liability, revenue and expense accounts. A simple description of assets is that they represent what the business owns; and the liabilities represent what the business owes or a claim on the assets.

The assets and liabilities may be stated very simply, but should show such classifications as to logically reflect the true status of the business. It doesn't take an accounting expert to set up logical divisions of our property and investments. A little thought applied to the needs of the business will show that we shall want book figures separately for such items as land and buildings, switchboards, material, accounts receivable, etc. When once established, there is little difficulty in keeping such divisions up according to current changes.

Revenues and expenses really require little discussion. But we should keep our records of revenues and ex-

penses carefully and completely. Naturally, this involves the matter of common sense classification or grouping so that items of the same nature may be readily segregated.

If you want to know what your salary payments have been for the year, you don't want to have to go through every entry made to pick them out—you want a column or a sheet or a series of reports headed "Salary Payments" so that all that will be necessary is to make a summary.

To be complete, the operating expenses must reflect the cost of all things used up in conducting the operations. This leads to the thought that along with other expenses we should include an item or account which indicates currently the loss in service value occasioned by using up physical property employed in the business. In other words, we should provide for depreciation.

And whether such provision is actually b e i n g m a d e currently through entries to the books, you can bet that the man with even the smallest business knows that the problem is there. It's a matter deserving of giving some practical thought.

In conclusion, and at the risk of too much repetition, I want to summarize briefly what has been discussed. In the first place, we should not dodge the matter of record keeping or accounting because there have been a lot of theories which have left the impression that the subject is complicated or mysterious.

Second, since we are going to keep records, let's start at the source and keep accurate primary records. And third, let's set up the kind of records that will fit the size of the business and give the information needed with the least delay and effort.

When we have done this, then aim at keeping all the records neat, clean and in such order that it will be a source of pride to open them for inspection or audit, rather than a source of worry.

▼ ▼

Young Men Who Make Industrial Scientists

The instinct of workmanship, defined as "a pleasure in the act of creation or construction which is its own reward," is the first need of candidates for jobs in industrial scientific laboratories, according to a talk by John Mills, well-known physicist and executive of the Bell Telephone Laboratories, New York City, before the Society for the Promotion of Engineering Education, meeting recently at Cambridge, Mass.

Industrial physics is now among the occupations growing most rapidly. More and more young men are being taken into the industrial laboratories or are applying for jobs in them. Presumably more and more students in colleges or high schools are thinking of such careers. Mr. Mills describes a test which any of these would-be scientists can give himself.

Imagine, he says, according to The Week's Science, three possible projects, all requiring time and effort. One will make money. Another will bring fame. The third will provide neither of these but is exactly the kind of work you like to do. Unless you instinctively choose this third, you are not the best material for a career in industrial science. "You cannot," he says, "make an industrial scientist out of a bond salesman."

If the temperament of a young man, trained or employed in science, demands fame, personal power or financial success, that man's scientific job is not likely to be lasting. He may "turn into anything from a public speaker to an executive," but he is not likely to be either happy or a permanent success in an industrial laboratory.

SPARE MINUTES

By MISS ANNE BARNES

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

"CUT YOUR CLOTH according to your pattern." That was the way our grandmothers did before the days of ready-made clothing. But some of them had to buy extra yardage because they either did not know or care to bother learning how to lay the pattern on the cloth, according to instructions. So they bought an extra yard or more, making the excuse they were not experienced dressmakers. When they had finished cutting a garment they had no more left-over than did the careful cutters.

When the garment was cut and laid aside, the careful cutters gathered up the scraps of material which they preserved for two purposes: The larger pieces, for mending the garment when it later became worn, and the rest to be cut up into quilt patches. There was little waste. And oh, the happy memories those bright little quilt patches invoked as one lay under a quilt made from patches of home folks' dresses, aprons, shirts!

Our spare minutes are the left-over patches of time that come on the outside of our regular business hours. I wonder if we realize how many of them we waste. How much we could accomplish if we set our minds to doing it in our spare minutes.

How often we hear such remarks as these: "Time on my hands and nothing to do." "What can we do to kill time?"

Time is our most precious gift; wasting time our greatest extravagance. We cannot save up the spare minutes, as we do dress material scraps, and use them later.

There are so many good uses to which we can put these patches of time. They could be gay little patches instead of gray little patches, if we would spend them in some useful way instead of allowing them to go to waste. For instance, what a gay little patch of time we could make for the shut-in friend or acquaintance if we would telephone her during some of our spare minutes.

How glad most folks feel when they pull out of the mail box the long-looked-for letter we have delayed writing before, for no reason at all except that we could not find time. Our letter may contain only a short message but it makes a bright little patch of time for someone.

What is the correct pronunciation and spelling of that word we misused a few days ago? Why not look it up the next spare minute we have?

What constructive uses we can put to the spare minutes we have every day, by reading and refreshing our memory on some of our recent toll practices. Then the book will not present such a problem to us.

These were the last words of Queen Elizabeth: "All of my posessions for a moment of time."

GENERAL VIEW OF THE TELEPHONE EXHIBIT AT THE GREAT LAKES EXPOSITION. THE "HEAR YOUR OWN VOICE" EQUIPMENT IS ONE OF THE MOST POPULAR FEATURES PRESENTED

"Invisibility" of Telephoning Shown at Exposition

A NEW and up-to-the-minute exhibit of telephony, sponsored by the Ohio Bell Telephone Co., is one of the main features of the Great Lakes Exposition, which began its second year on Cleveland's lake front, May 29. The exhibit occupies the same space as last year in the Hall of Progress, one of the main buildings of the exposition. However, it has been entirely redecorated and only one of last year's features has been retained.

One of the new features is the oscilloscope, which enables visitors to see how their words, spoken into a telephone transmitter, act upon the electric currents so as to reproduce their voice at the other end of the line. They see before them in the "electric eye" a green line of light, which varies and jumps in accordance with the fluctuations in current caused by the voice or other sounds.

Besides "seeing" their voices, visitors again this year will be able to hear just how they sound over the telephone. By means of a device which records the voice on a magnetized tape, visitors who talk into a receiver can hear their voices come back to them a moment later. This device was one of the principal attractions of the exhibit last year.

Also new is a demonstration of "scrambled speech," which makes radio telephone conversations unintelligible to outsiders.

Another interesting exhibit is a large collection of historical telephone equipment. This was prepared by the A. T. & T. Co. and Michigan Bell Telephone Co. for Henry Ford's historical museum at Dearborn, Mich. Since the space in the Ford museum is not yet ready, the collection will be on display at the exposition all summer.

Four specially constructed cases had to be built to house the old telephones and other equipment, which form probably the most interesting collection outside the one at the Bell Telephone Laboratories in New York.

The Scrambled Speech Display of the Telephone Exhibit at The Great Lakes Exposition in Cleveland Is One Interesting Feature as Shown in This View.

Visitors to the Great Lakes Exposition Not Only Can Hear Their Own Voice, But They Can See Its Effect on the Electrical Currents in a Telephone Circuit By Means of the Oscilloscope.

IN THE NATION'S CAPITAL

By FRANCIS X. WELCH

Special Washington, D. C., Correspondent for TELEPHONY

RECENT REPORT OF SUBCOMMITEEE ON TECHNOLOGY sums up the technical progress made in wire and wireless communication, generally, recognition being given to its remarkable development in such a short time. Party friction is likely to result from President's endorsement of leader to succeed the late Senator Robinson. Work U. S. Supreme Court has done this year

THE RECENT REPORT of the Subcommittee on Technology to President Roosevelt's National Resources Committee contains some scraps of information and conclusions which may be of interest to the telephone industry. The subject of "Communications" takes up 39 pages of this 389-page volume, and is subdivided into "Wire and Wireless," which was prepared by FCC Chief Engineer T. A. M. Craven, and "Printing and Photography," which was prepared by the U. S. Public Printer A. E. Geigengack.

Most of Mr. Craven's section is given over to a factual recital of the technical progress made in telegraphy, telephony, radio broadcasting, and television. It is when he speaks of probable future developments that Mr. Craven covers territory which may not be quite so familiar to TELEPHONY readers. He lists four inventions now in existence but undeveloped for various reasons—mostly economic:

1. Further development of dial switching equipment for local service in urban centers, including new types of equipment and improvement of old types. The report adds that in metropolitan dial areas there will be further development of so-called extended area or extended scope service whereby subscribers in outlying areas are given access to all telephones located in specified larger areas—this service to be by direct dialing without intermediary help of an operator.

2. Construction of the first continuously loaded Atlantic telephone cable. This project was definitely decided upon some years ago but deferred during the depression. Such direct contact between telephones in America and Europe will give a service superior to the sound-surging contact now available.

3. Application of carrier telephony to existing telephone toll cables and a very high frequency carrier for existing open-wire lines. On this point the subcommittee report states:

> With the experience gained in the technique of carrier systems and the development of a new type of amplifier tube, more powerful and more stable, it is indicated that the use of carrier telephony will be greatly extended by its application to cable circuits to which it has thus far only been applied on an experimental basis. It is also plainly indicated that carrier systems with a much wider frequency band will be applied to open-wire circuits. It is expected that these developments will affect existing construction. The development of carrier telephony to cables will provide additional facilities for the use of the public.

4. Feedback amplifier with improved stability and gain characteristics. This amplifier, it is hoped, will considerably improve the service to the public over long distances.

MR. CRAVEN'S report lists also two telephone inventions now in use to a limited extent which are likely to be expanded and developed:

1. Dial exchanges in rural communities. (The use of these unattended local automatic exchanges is expected to improve the quality of rural service.)

2. Possible development of very high efficiency electromagnetic receivers in combination with transmitters of the same type. Such a development, according to the report, would considerably improve the fidelity of transmission by eliminating certain causes for distortion.

Among the developments that will "probably" be made in the near future is the following list:

1. Very high frequency coaxial cable carrier systems for deriving a very large number of telephone and telegraph channels and a very broad transmission frequency band for television. (The Bell experimental cable now being installed between New York and Philadelphia was mentioned.)

2. Television and its possible operating relation to telephony.

3. The development of point-to-point television service to supplement the telephone. This service, which has had considerable experimental success in Europe, particularly in Germany, possesses obvious advantages of closer communication contact between individuals.

4. The report predicts that much progress will be made in the direct handling of toll calls by local operators in manual central offices and by dial offices, via direct circuits to the points called, or via a group of circuits to such points with automatic selection of an idle circuit, or via tandem or toll switchboards. Indications are that this method will be extended to more and more distant points for which direct circuits are provided, with attendant speeding up of the service and reduction in costs.

SUMMING up his analysis of technical progress in wire and wireless communication generally, Mr. Craven's report emphasizes the fact that probably no industry in the world has had such a rapid growth and such remarkable development in such a short space of time.

Television stands out as the most unpredictable and complicated problem because it threatens not only to have a profound effect upon other forms of communication, but also upon the basic economic and financial structure of our national life—changing or modifying the social cus-

toms and habits of individuals perhaps even more than sound radio broadcasting did since the early twenties. The report concludes on this point:

The next corner to be turned, however, is an economic rather than an engineering one, and it can be stated briefly in one short question "Who is to pay for television?" Will the public accept a television service based upon a continuance of the present system of commercial aural broadcasting and its extension into television? Will a "looker-in" be willing to sit in a darkened living-room at home intently peering into the screen of his television receiver?

It is believed that the greatest service which communications can do in the future will be to provide extensions into the hitherto remote and inaccessible places whereby people who formerly had no means of communication can be connected with the communication arteries of the world. Tremendous progress has been made during the last decade in this direction and, undoubtedly, tremendous progress will take place in the future. The other great forward step in world civilization which can be made is in the effective use of communications, both telegraph and telephone by wire, but more especially by radio, in the development of understanding, mutual respect and tolerance among the nations of the world. Much has been done along these lines in the past and a great deal more is expected in the future.

THE PASSING of the universally loved and respected leader of the Senate majority, Senator Joe Robinson of Arkansas, complicated an already-tense situation in Congress. This statement has reference to the political setup in general, not merely the Supreme Court reform bill.

It was obvious, of course, even before the death of Senator Robinson, that the Democratic chieftains were hopelessly split. Indeed, the increasing intraparty dissension in the face of President Roosevelt's stubborn refusal to give up the fight for the "slow motion" court packing compromise was said to have been among the weights that made the late Senate leader's burden too heavy to bear.

Now, on top of all this friction is precipitated a contest for leadership. Because it is necessarily a family affair, a party leadership controversy is always a delicate matter, even in times of serene party harmony. There is a certain amount of hurt feelings, disappointed ambitions, and secret peeves that follow in the wake of the relatively quiet cut-and-dried type of intraparty reorganization.

Coming as it does at a time when harmony is shattered and senatorial temperatures sizzling, this particular leadership squabble is likely to spread oil on the raging fires. By his virtual endorsement of acting leader Senator Barkley of Kentucky, President Roosevelt has, in the opinion of some observers, divided some of his own loyal camp.

Certainly no one has been more steadfast in his devotion to party discipline than Senator Pat Harrison of Mississippi, an aspirant for leadership. The rebuff to the Mississippi Senator and his friends may produce some unwelcome reaction for the Administration in legislative battles other than that on the Supreme Court bill issue.

Of course, the leadership contest itself may well be decided before these lines appear in print, and in that case it is only to be expected that will be the time for all good Democrats to come to the aid of their party by vowing unswerving allegiance to the new leader, etc., etc. Do not be misled, however, by such polite gestures. There will be rankled feelings long after the 1937 session passes into history.

At this writing, it would appear that the President has decided to settle the court issue the "hard way." If he were still following the football tactics of a "quarterback," to which he has compared himself in the past, he might not have chosen this course. As every football fan knows, when the star ball carrier is taken off the field in a stretcher in the middle of a crucial series of plays, the smart quarterback usually calls for "time out."

This would mean sending Congress home to cool off until next January. But apparently the President intends to fight it out on the established line if it takes all summer, and it may take at least that long.

SO FAR, Congress has done little productive work for 1937, however much it has suffered with the heat and bitterness of debate. Compare this with the work of the Supreme Court at the term which ended June 2 last. Only 110 cases on the Supreme Court docket remain for the October term. In no case is there any action remaining for the court to take at this time. All these cases are in stages where further procedure by the contesting parties is required, such as filing of briefs, answers, and so forth.

Since last October, however, over 1,000 cases were pleaded in the court's docket. Of these the court disposed of 268 on their merits, writing, in all, over 160 opinions. Only 50 of these cases, incidentally, involved constitutionality of state or Federal legislation and in only 10 cases were laws declared invalid—state laws in every instance.

Of these 10 state laws kicked out by the court in its 1936-37 term, five were held to violate fundamental constitutional rights of individual citizens, such as the Oregon Criminal Syndicalism law under which a communist had been imprisoned.

Such is the record of the court which for the past ten years has never adjourned with its docket in arrears. When either Congress or the administrative branches of the Federal government can match that record of efficiency, there might be more point to the suggested criticism of the court taking a four-month vacation.

It isn't as if the Supreme Court Justices spent their so-called vacation entirely in pleasurable pursuits. Any one familiar with the court well knows that the Justices always use the summer recesses to do intensive reading of briefs, books, and other data in the quiet of their summer homes away from Capital heat.

Justice Brandeis is said to average over 200 books on technical and economic subjects during a single summer recess. Other Justices likewise use the "breathing spell" to recharge their mental batteries and keep abreast of world affairs (although the late Justice Holmes used to confess a weakness for detective stories and French novels "just for fun"). If the truth were known, the Supreme Court Justices probably do more real mental work while they are on vacation than some government officials do when they are supposed to be working at their offices.

▼ ▼

Coronation Issue of Winnipeg Directory

Commemorating the crowning of King George VI and Queen Elizabeth of the British Empire, a special and elaborate "Coronation Issue" of the Winnipeg telephone directory has been published by the Manitoba Telephone System. The cover is printed in five colors—red, yellow, green and gold on a background of blue—and its design cleverly embodies the British Coat of Arms, St. Edward's Crown, maple leaves (symbolic of Canada), and sheaves of wheat (symbolic of Manitoba).

The alphabetical section of the book, comprising 192 pages, contains more than 50,000 telephone listings. This represents an increase of 1,500 telephone subscribers in the Winnipeg exchange area within the past six months, the largest increase in recent years for a similar period.

Mathematics For Telephone Engineers

By H. H. HARRISON

ARTICLE EIGHT, SECTION I, of this mathematics series—especially written to aid junior telephone engineers in handling alternating current problems —takes up the discussion of vectors. This series was begun last year in the May 30 issue of TELEPHONY

QUANTITIES such as displacements, which can only be completely defined when their *directions* as well as their *magnitudes* are specified, are termed *directed quantities* or *vectors*. Changes of motion, the force in pounds exerted on a body, etc., are incompletely stated unless their magnitude is associated with their direction.

Vectors comprise displacements, velocities, accelerations, forces, moments,

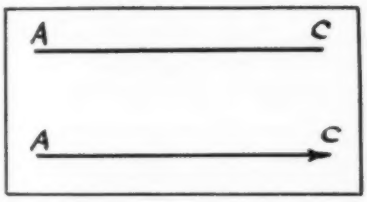


Fig. 118. Representation of Scalar and Vector Quantities.

electric and magnetic fields, etc. Such quantities as time, temperature, mass, work, etc., are numerics only. Their magnitude can be represented to a chosen scale by a line but the direction of this line, vertical or horizontal, has no significance. Such quantities are termed *scalar* quantities or simply *scalars*. Thus a scalar has magnitude and sense only; a vector, magnitude, direction, and sense.

A vector quantity may be graphically represented by a line whose length measures the magnitude of the quantity and whose direction is parallel to the line of action of the quantity. In Fig. 118 AC is a line which has length only, but the same line with the arrowhead attached to it is the vector whose magnitude is AC and whose direction is indicated by the arrowhead.

Vectors such as AC are written AC or |AC| and can also be written $A\alpha$, $B\phi$, etc., the suffixes α and ϕ giving the directions referred to a *standard* or *reference* line and A, B, indicating the magnitudes.

If in Fig. 119, for instance, the line OX is the reference line then OP can be written $2(20°)$ or $2\angle 20°$ and OQ $= 3(-70°)$ or $3\overline{\backslash\ 70°}$, the signs $\angle$, $\overline{\backslash}$ indicating that one is a positive and the other a negative angle or that one is *leading* and the other *lagging* with respect to the line OX.

A convenient way to regard a vector is to think of it as an operator transferring a point from a certain initial position to a distance represented by the length of the vector and in a direction parallel to it. An example of this method of looking at the matter is furnished by the vector representation of displacements, the resultant of two or more forces, or the combination of two or more velocities impressed upon a body.

In Fig. 120, the point, O, is shown as undergoing simultaneously two displacements, OA and OB, in the directions indicated by the vectors. Obviously, due to the displacement OA, O must be somewhere on the horizontal dotted line, a, of the figure, while the

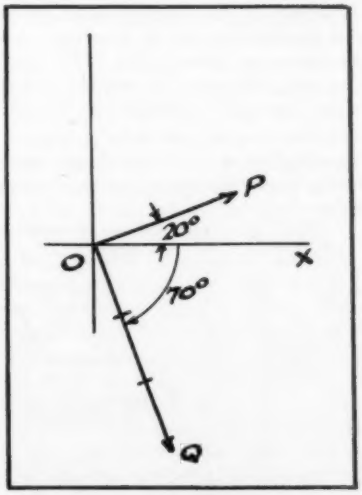


Fig. 119. Graphical Representation of Vector Quantities.

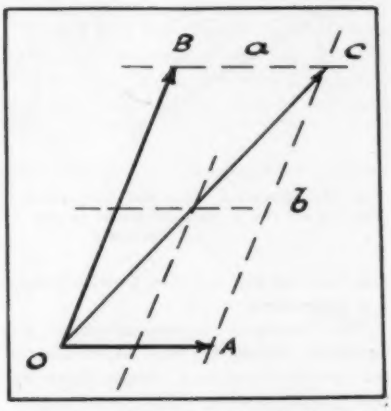


Fig. 120. Resultant of Two Vectors, OA and OB.

displacement due to OB operating on O will cause this to lie somewhere on the line b.

The intersection of a and b is clearly the position ultimately reached by O; and the path of O, at any moment of time as the joint displacement proceeds, is along the line OC. If the vectors represent forces, OC will be the resultant both as to magnitude and direction of the combined action of OB and OA on a body O.

ADDITION OF VECTORS: The addition of two or more vectors can be accomplished graphically. Thus the sum of the three vectors $A_1\angle\theta_1 + A_2\angle\theta_2 + A_3\angle\theta_3$ is given by the construction of Fig. 121 where the vectors are added graphically to each other, the vector A closing the uncompleted polygon being the resultant both with respect to magnitude and direction.

In Fig. 122 (a) three vectors OA_1, OA_2, and OA_3 are drawn. They are added to one another in Fig. 122 (b) end for end, and parallel to those of Fig. 122 (a). The algebraic sum of their projections on the vertical line gives the projection of the resultant OR. Thus $Oa_1 + a_1a_2 - a_3a_3 = Oa_3$, which is the projection of the resultant. Hence from the diagram it is clear that the projection of the resultant is equal to the algebraic sum of the projections of the components.

The vectors need not be stationary but can be rotating about O, in which case their directions represent their phases relative to the reference line. Their projection on the vertical axis at any moment represents the *instantane-*

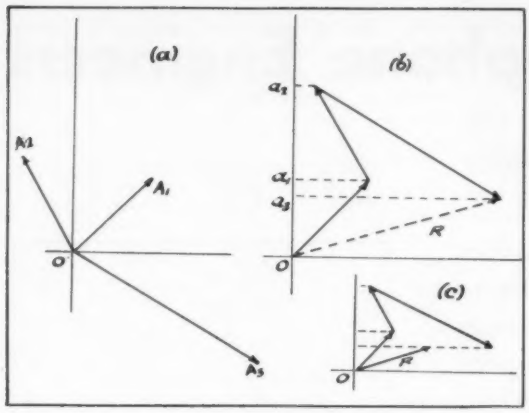


Fig. 122. Showing That the Projection of Two or More Vectors on the y Axis Is Equal to the Projection of the Resultant.

ous value of the function to which they are equivalent.

The converse statement—that an equation which is true *algebraically* for the instantaneous values given by the projections is true *vectorially*—usually holds but not invariably. Thus in Fig. 122 (c), the projection of R is equal to that of a resultant which would close the polygon, but is clearly not the vectorial sum of the three vectors.

A vector may be specified in terms of its rectangular components. The vector OB of Fig. 123 (a) is resolved into horizontal and vertical components, a and b. Vector Oa Fig. 123 (b) has a horizontal component only. Their addition can be effected by adding the horizontal components together, and doing the same for the vertical components. This cannot be done arithmetically. $(a + a_1) + (b + 0)$ does not give the vector OC. The b components have to be added vectorially as shown in Fig. 123 (c). In Fig. 123 (a) if a and b are known, then $OB^2 = a^2 + b^2$ and θ is the angle whose tangent is b/a. Therefore $OB = \sqrt{a^2 + b^2}\ \angle\theta$ and it is completely specified both as to size and direction.

SUBTRACTION OF VECTORS: Fig. 124 (a) shows the method of subtracting vectors from one another. Vector a is to be subtracted from vector b. Joining the free ends of a and b gives vector c, which is equal to b-a. This is readily proved as follows: $b - a = b + (-a)$, and multiplying a by (-1) or rotating a through 180° the resultant, $c = b - a$, is found by completing the parallelogram.

Fig. 124 (b) requires no explanation. The magnitude of c is the same in both cases, but the signs are opposite. The notion of (-1) as an operator turning a vector through 180° should be noted.

GEOMETRICAL REPRESENTATION OF IMAGINARY QUANTITIES: The square root of a negative number appears to be an impossibility, since the square of any quantity, positive or negative, is itself positive. But, in the same way, a negative number which is less than nothing would appear to be impossible. Negative numbers, however, are represented by lines of suitable magnitude but opposite in direction to those representing positive numerical quantities. (See Fig. 125 (a).)

By convention positive numbers are laid off to the right along the horizontal line through O and negative numbers to the left. A negative number can be regarded as a positive number multiplied by -1 which, in effect, rotates it through an angle of 180°.

The mean proportional between two quantities, one positive and the other negative, will be the square root of the product of their numerical values, and its direction will be the mean of the two directions; that is, it will be perpendicular to them (Fig. 125 (b)). The perpendicular is termed "imaginary" and the horizontal line "real."

If the vertical quantity $1 \times \sqrt{-1}$ is multiplied by $\sqrt{-1}$, it then becomes 1×-1, multiplication having rotated $1\sqrt{-1}$ through a further right angle. This process is equivalent to multiplying $+1$ by $(\sqrt{-1})^2$ or rotating it through an angle of 180°. $\sqrt{-1}$ may be regarded, therefore, as an operator which, applied to any numerical quantity, changes its axis of reference.

Multiplying -1 by $\sqrt{-1}$ is equivalent to rotating -1 through a further 90° and the vertical line resulting is directed downwards and is, therefore, opposite to the vertical line of Fig. 125 (b). $\sqrt{-1}$ is usually written j and $(a + jb)$ represents the horizontal and vertical components of a vector $Z\angle\theta = \sqrt{a^2 + b^2}\ \angle\theta$ where θ is the angle whose tangent is b/a.

$1/j = (1/j) \times (j/j) = -j$, or

$$1/j = \frac{1}{1\ \angle\tan^{-1}\infty} = 1\ \angle -\tan^{-1}\infty$$

$$= 1\sqrt{-\pi/2}$$

i. e., $1/j$ produces a rotation of $\pi/2$ in the negative direction.

Also, $1 + j = \sqrt{2}\ \angle\pi/4$

$1 - j = \sqrt{2}\sqrt{-\pi/4}$

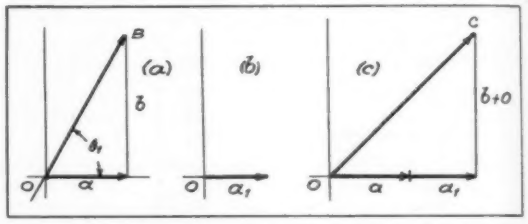


Fig. 123. Addition of Vectors by Summation of Their Vertical and Horizontal Components.

$1/(1 + j = (1/\sqrt{2})\ \angle -\pi/4$

$\sqrt{j} = \sqrt{1}\ \angle\pi/2 = 1\angle\pi/4$

If j is written $(-1)^{0.5}$ instead of $\sqrt{-1}$, any angle can be represented by varying the index. Thus $(-1)^{0.25} = 45°$, $(-1)^{0.5} = 90°$, $(-1)^1 = 180°$ and so on. If vectors are written in this way, then $A(-1)^{0.3} \times B(-1)^{0.3} = AB(-1)^{0.5}$, just as the quantities $a^m \times a^n = a^{m+n}$. Thus it would appear that $Z\angle\theta \times Z_1\ \angle\phi = Z \times Z_1 \angle\theta + \phi$, and this is shown later to be the case.

Bearing in mind that $j_4 = 1$ and that, therefore, $1^{1/4} = j = \sqrt{-1}$, 1 can be

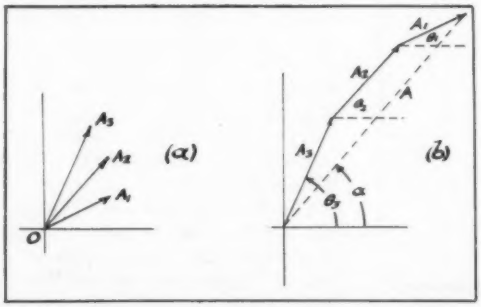


Fig. 121. Graphic Addition to Two or More Vectors.

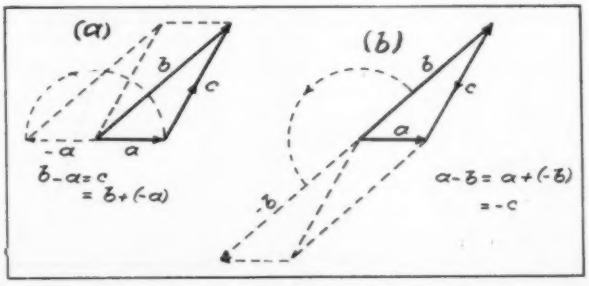


Fig. 124. Graphical Subtraction of Components.

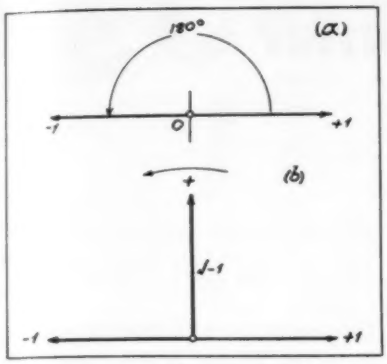


Fig. 125. Geometrical Representation of Imaginary Quantities.

used as the operator; then 1^1 is equal to a complete revolution, 1^2 two revolutions and so on. Using 1 as the operator, the angle 1^n is twice that represented by $(-1)^{n/2}$.

MULTIPLICATION OF VECTORS:

Let $Z = Z_1 \times Z_2 = (a + jb)(c + jd)$
$= (ac - bd) + j(ad + bc)$, then

$$Z = \sqrt{(ac - bd)^2 + (ad + bc)^2}$$
$$= \sqrt{a^2c^2 - 2abcd + b^2d^2 + a^2d^2 + 2abcd + b^2c^2}$$
$$= +\sqrt{a^2(c^2 + d^2) + b^2(c^2 + d^2)}$$
$$= \sqrt{(a^2 + b^2)} \times \sqrt{(c^2 + d^2)}$$
$$= Z_1 \times Z_2$$

$\tan \theta = ad + bc/ac - bd$

But $\theta = \phi_1 + \phi_2$ since $\tan(\phi_1 + \phi_2)$

$$= \frac{(\tan \phi_1 - \tan \phi_2/1 - \tan \phi_1 \times \tan \phi_2}{b/a + d/c}$$
$$= \frac{}{1 - (b/a \times d/c)}$$

Multiplying top and bottom by ac
$= (bc + ad)/(ac - bd)$

Therefore, $\tan \theta = \tan(\phi_1 + \phi_2)$ and $Z_1 \angle \phi_1 \times Z_2 \angle \phi_2 = Z_1 \times Z_2 \angle \phi_1 + \phi_2$.

The rule then is:

To multiply together two vectors Z_1 and Z_2, multiply the absolute lengths and add the angles. The product will be the resultant vector. If this result is to be multiplied by a third vector $Z_3 \angle \phi_3$, the result will be given by $Z_3 \times (Z_1 + Z_2) \angle \phi_1 + \phi_2 + \angle \phi_3$. (See Fig. 126.)

DIVISION OF VECTORS:

Let $Z = Z_1/Z_2 = (a + jb)/(c + jd)$.

Multiply this top and bottom by the conjugate vector $(c - jd)$; then

$$Z = (a + jb)(c - jd)/c^2 + d^2.$$

$\tan \theta = (bc - ad)/(ac + bd)$.

$\tan \phi_1 = b/a$, $\tan \phi_2 = d/c$ and $\theta = \phi_1 - \phi_2$.

$\tan(\phi_1 - \phi_2) = (\tan \phi_1 - \tan \phi_2)/(1 + \tan \phi_1 \times \tan \phi_2)$

$$= \frac{b/a - d/c}{1 + bd/ac}$$
$$= \frac{ac(b/a - d/c)}{ac + bd}$$
$$= (bc - ad/ac + bd$$
$$= \tan\theta.$$

Thus $Z_1 \angle \phi_1 / Z_2 \angle \phi_2 = Z \angle \phi 1 - \phi 2$, and the rule is:

To divide a vector by another, divide the absolute lengths arithmetically and subtract the angle of the divisor from that of the dividend. The two processes may be carried out graphically, as shown by Fig. 127.

In Fig. 127 (a) Oa × Ob is obtained as follows:

Mark off on the base line Ox a distance O-1 equal to unit length for the scale adopted. Rotate Ob so that it rests on the base line Ox and from b draw a line parallel to line 1-a. Extend Oa until it cuts the parallel line drawn from Ob on the base line and this will give the numerical result of a × b. This follows from the principle of similar triangles. Thus triangles aO1 and xOb are similar and therefore $b/1 = x/a$ or $ab = x$.

Ox is now rotated counter-clockwise, so that the angle it makes with Ox is $(\alpha + \beta)$ and Ox represents the final result in magnitude and direction. Fig. 127 (b) shows the graphic method for obtaining Z_1/Z_2. Oa is Z_1. O-1 representing unity is marked off on the vertical axis and Ob rotated on to the same axis. b is joined to the extremity a of the vector Oa and at O-1 a parallel line is drawn cutting Oa at x.

By similar triangles $1/b = x/a$; therefore $x = a/b$, the intersection of the line drawn from 1 cutting Oa at a point equal to Ox. The vector Ox is then rotated from the line Oa through the angle $-\beta$ and then occupies the angular position $\alpha - \beta$.

POWERS AND ROOTS OF VECTORS: If, in Fig. 128 $Oa = a \angle \alpha$, then $(a \angle \alpha)^2 = a \times a \angle 2\alpha = a^2 \angle 2\alpha$ by the multiplication rule.

Making O-1 on the base line to represent unity, then 1 is joined to a by the dotted line shown. a is also projected on the base Ox and from here a line is drawn parallel to the first dotted line. Oa is extended to cut this line at b and Ob represents $a \times a$ or a^2. Ob is then rotated through an angle α so that its total angle with respect to Ox is 2α.

The reverse process of finding the square root can readily be established. To find the square root of b, write $a = \sqrt{b}$; then $\sqrt{b} = (a^2 \angle 2\alpha)/a \angle \alpha = a \angle \alpha$. The square root of the vector b is extracted and the angle which ob makes with the reference line is halved.

The operation for finding higher powers of a vector than the second will be obvious since it only amounts to continued multiplication. Again the cube or nth root of a vector will be the nth root of the absolute length of the vector with its angle divided by 3 or n.

(To be Continued)

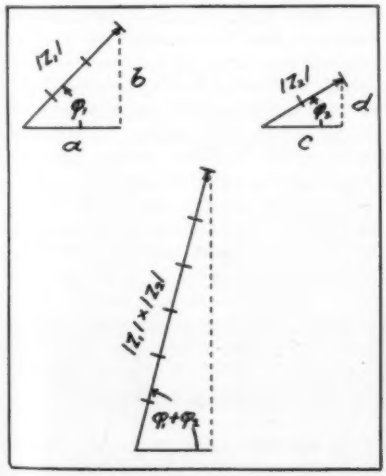


Fig. 126. Showing the Process of Multiplication of Z_1 and Z_2.

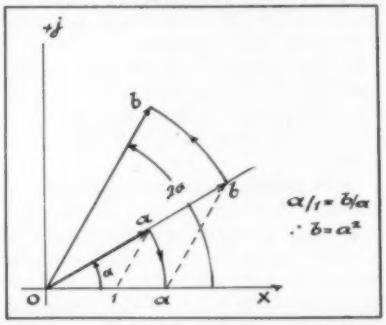


Fig. 128. Graphical Methods of Obtaining Powers and Square Roots of Vector Quantities.

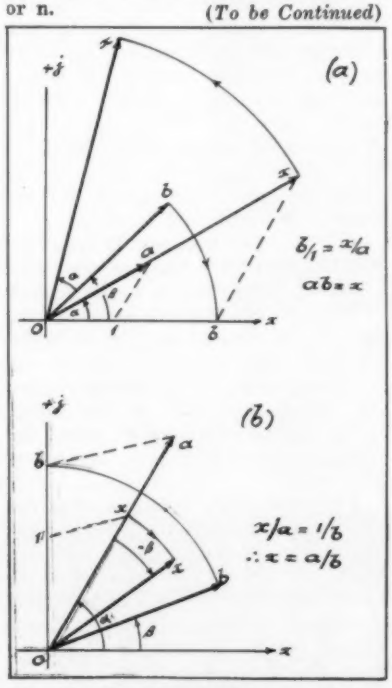


Fig. 127. Graphical Methods for Finding $Z_1 \times Z_2$ and Z_1/Z_2.

The Operators' Corner

By MRS. MAYME WORKMAN

Traffic Supervisor, The Illinois Telephone Association, Springfield, Ill.

TO COMPLY with a customer's request to be notified at the end of a stated period and to make the necessary notification on all long distance calls originating at pay stations is an important responsibility of toll operators. When an operator fails to make the proper notification it may result in dissatisfaction on the part of the customer, loss of revenue to the company, or both.

When the telephone company assumes the responsibility of complying with a customer's request to be notified when he has talked a stated period on a long distance call and the operator fails to give the necessary notification at the proper time, if the customer objects or refuses to pay for the time he talked over this period, the telephone company assumes the loss.

Recently a practice was introduced to notify a customer, upon request, at the end of *two* stated periods. When a request of this kind is received, the operator will enter, in the "Special Instruction" space, for example, "nfy 3 & 5 mins." When the operator notifies the calling party at the end of the first stated period she will encircle only that part of the entry in the "Special Instruction" space applying to the first period. For example, "nfy 3." When notification of the second stated period is given, the remainder of the entry in the "Special Instruction" space, for example, "& 5 min." is encircled.

Whenever an operator is responsible for notifying the calling party when he has talked a stated period, it is very important to enter on the back of the ticket—as near as possible to the corner which will be upward and nearest the operator when the ticket is placed in the spiral ticket holder—the time at which the stated period will expire, for example, "9-27."

This time entry should be observed at frequent intervals. When the stated period has nearly expired, stamp off the ticket very lightly at short intervals, as an aid in determining its expiration. After stamping off the ticket, be sure to draw a wavy line through each trial arrow so that none will be confused with the final stamp.

CALLING TIME upon request is an important responsibility of toll operators. Series No. 296

If the customer is to be notified at the end of two stated periods, after the notification has been given at the end of the first stated period, draw a line through the time entered at which the first stated period expired, and then enter the time at which the second stated period will expire.

When an operator fails to comply with a customer's request to be notified at the end of a stated period or periods, the call is referred to the supervisor. She will determine the charge and will enter it in green in the "Charge" space. She will reach the calling party, apologize for the error, and tell him of the time to be charged, saying, for example: "This is the Long Distance supervisor. On your call to (called place) (address name) or (number), I am sorry that the operator failed to notify you at the end of (stated period). You talked (no. of minutes) minutes. The charge is (amount)."

The supervisor will encircle the entry in the "Charge" space in green and will enter an explanation on the ticket. If the calling party expresses any unwillingness to pay for the time in excess of the stated period, the supervisor will make the chargeable time agree with the stated period, re-determine the charge, and tell the calling party that the charge will be for the stated period only.

In this case the supervisor will write the number of minutes in green across the stamp and sign her personal number. She will enter the number of minutes in green in the "Mins." space and the charge, encircled, in the "Charge" space, drawing a line through the entries already there, and enter a further explanation on the ticket.

In a case where the calling party has made a request to be notified at the end of two stated periods, the supervisor will use but one timing allowance of 15 seconds, whether or not both notifications were given.

Be sure and call time when requested in order that you may retain your customers' confidence and good will and avoid loss of revenue to your company.

Questions from Illinois Operators

1. If the charge is reversed on a station-to-station call to a station which has a 10 or 15-cent station-to-station rate, is it necessary to place the letter "P" in the "Class" space?
2. Should not the tributary operator be instructed to answer by her office name instead of saying "Hello"?
3. How many hours should a medium-sized town operator put in to give good service?
4. How long can a toll center hold a tributary telephone for a long distance call?
5. Should the time be entered in filing space on all WH reports?

The answers to these traffic questions are presented on page 28.

▼ ▼

Winner of Good Public Relations Slogan Contest

"Give Service Your Customers Can Recommend." That is the prize-winning slogan in a contest conducted recently by the central division of the New England Telephone & Telegraph Co. Miss Dorothy Sargent, attractive young operator at Northboro, Mass., submitted the winning slogan, selected from 1,800 entries.

According to the story of the contest, as related in Telephone Topics, departmental committees selected the five best slogans presented by members of their group and picked the departmental winner. From these 25 slogans thus selected, the division judges (members of the central division public relations committee) chose the grand winner.

Following are the names of the departmental winners and their slogans: Alfred Hall, Lancaster, N. H.—"Friendly service well given is good will well won." Winna C. Ganong, Boston, Mass.—"Serve others as we would like to be served." Elsie M. Mongan, Manchester, N. H.—"Let satisfaction dwell at the sign of the bell." Helen Standley, Salem, Mass.—"Satisfied customers make pleasant working hours." Ernest R. Dragon, Salem, Mass.—"An ounce of demonstration is worth a ton of talk."

BECAUSE IT GETS RESULTS!

It's no secret that Automatic Electric C-A-X is the most widely used small automatic exchange equipment in the world today. Over 600 of these full-automatic, unattended units are daily providing their respective communities with the finest type of swift, modern service.

The reason for this overwhelming preference? Simply that the C-A-X gets results wherever it is used. These telephone companies have tried out C-A-X operation under every possible condition of climate and traffic. They know from experience that it gives better service and is more economical. The actual working records of the hundreds of C-A-X's in daily use furnish the testimony for this statement.

Remember, it pays to play safe and buy equipment on facts—on actual case records of hundreds of profitable installations and years of completely dependable operation. That's why we say—Install Automatic Electric C-A-X—and be sure!

Write today for literature describing C-A-X equipment. Or, better yet, send us full information about your small exchange, and we will show you, in actual figures, just what savings C-A-X operation can effect for you!

All Automatic Electric C-A-X units—whether of the switch or relay type—are supplied in neat, all metal, dust-proof cabinets similar to the one shown above.

AUTOMATIC ELECTRIC

TELEPHONE, COMMUNICATION AND SIGNALING PRODUCTS

Distributed by: AMERICAN AUTOMATIC ELECTRIC SALES COMPANY, 1033 W. Van Buren Street, Chicago

Export Distributors: AUTOMATIC ELECTRIC SALES COMPANY, LTD., Chicago

Personal Notes About Telephone Men

H. M. STEWART, of Austin, Texas, has resigned as secretary of the Texas Telephone Association to accept a similar appointment with the Pennsylvania State Telephone & Traffic Association, with offices in Harrisburg. He will take up his new duties September 1. Mr.

H. M. STEWART, Austin, Texas, Has Been Appointed Secretary of the Pennsylvania State Telephone & Traffic Association, Effective September 1.

Stewart has served most efficiently as executive officer of the Texas association since October, 1933.

Prior to that time Mr. Stewart for 10 years was associated with the Kellogg Switchboard & Supply Co. For several years he was district manager of sales for the Kellogg company in the southwest, with headquarters in Dallas, Texas.

Mr. Stewart was previously engaged in telephone operating work for approximately seven years. His first connection with the telephone field was during his high school days as night operator in his home town and birthplace, Centerville, Ala. After finishing school he was a helper to the construction crew and later he became station installer at Anniston, Ala. During the World War Mr. Stewart was assigned on special duty at Camp Pike, Ark., by the U. S. Signal Corps.

No little credit is due Mr. Stewart for the good work carried on by the Texas association in the interests of its member companies and the telephone industry at large. In the past four years the association's membership has been increased substantially; invaluable aid has been given to member companies and their interests have been closely guarded in measures brought up in the state legislature.

Not only is Mr. Stewart experienced with the wide variety of problems incident to the furnishing of telephone service, but he has a keen understanding of human nature. He appreciates the importance of the human element in the success of a telephone association as well as a telephone operating company.

▼

CARL GEARHART, formerly assistant manager of the Peoria exchange of the Illinois Bell Telephone Co., has succeeded Perry P. Anderson as manager of the Canton (Ill.) exchange.

▼

FRED R. KAPPEL, plant engineer, Northwestern Bell Telephone Co., succeeds R. H. Fair as plant operations supervisor. Mr. Kappel began as a groundman for the company in 1924, and has served in a number of capacities as he climbed the ladder of promotion.

▼

F. M. LANTZ, formerly of Warsaw, Ind., is now in full charge of the Fowler Telephone Co., Pella, Iowa. Mr. Lantz was with the United Telephone Cos., Inc., with headquarters at Warsaw. Ind., for about eight years.

Prior to that he was with the Midwest Telephone Co. at Kansas City, Mo., as general manager.

Mr. Lantz entered the telephone business in the summer of 1908 with the Marshall Telephone Co. at Marshalltown, Iowa. He became manager of the Winnebago Telephone Co., Forest City, Iowa, in October, 1917. In February, 1919, Mr. Lantz took charge of the exchange of the Farmers Mutual Telephone Co., Clarinda, Iowa. Two years later in December, 1921, he went to Kansas City as general manager of the Midwest Telephone Co. and later took charge of the company's properties in Indiana which eventually became known as the United Telephone Cos., Inc.

Mr. Lantz is well known in Iowa through his years of service there in practically every branch of the business.

▼

P. P. ANDERSON, manager of the Canton, Ill., exchange of the Illinois Bell Telephone Co. for the past nine years retired from active service July 1. Mr. Anderson was an employe of the Home Telephone Co., of Canton, prior to its consolidation with the Illinois Bell.

Mr. Anderson will confine his future activities to the operation of the Farmington Telephone Co., of Farmington, Ill., in which he has a stock interest.

▼

L. P. SCHLENTZ, sales training supervisor in the general commercial department of the Lincoln Telephone & Telegraph Co., Lincoln, Neb., has been named manager of the company's Postal Telegraph division. The promotion became effective July 15.

Mr. Schlentz joined the telephone organization as a solicitor in the Lincoln business office, in October, 1928. In July, 1930, he was made assistant contract manager and in February, 1934, he was advanced to the position of sales manager. His promotion to the general commercial staff came in January, 1936.

Mr. Schlentz succeeds W. S. Heckart, who has been in charge of the telegraph division since April, 1935. Mr. Heckart has been transferred to the Omaha division of the Postal Telegraph company.

"Mr. Schlentz will bring to his position the wealth of experience gained from eight years in the Lincoln business office, where he was in charge of sales work until his appointment last year to the general commercial staff," said General Commercial Superintendent H. F.

L. P. SCHLENTZ, Lincoln, Neb., Has Been Named Manager of the Postal Telegraph Division of the Lincoln Telephone & Telegraph Co.

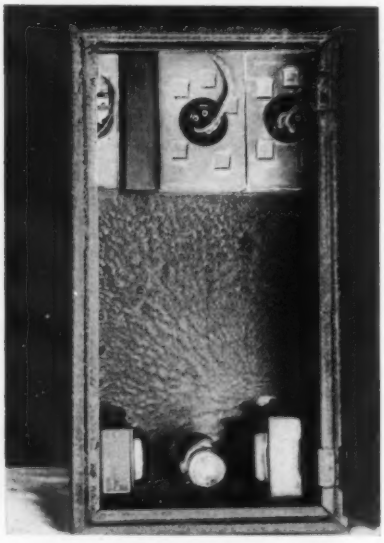
McCulla, in announcing the appointment. "His tactful handling of customer relations problems will be particularly valuable in our Postal Telegraph division and his years of telephone training will help him to further unify the two branches of our business."

BUYS AND SELLS BY TELEPHONE
• "EVERY few days I telephone about prices," says an Oklahoma farmer. "Very often I sell for more over the telephone than I can get at the home market—and I also buy by telephone. We have had a telephone in our home for 25 years—don't see how we could do without it."
It is a great help to be able to talk to some one miles away as easily as talking across the room. A help when you want to ask the country agent's advice or transact business in the busy season. A help when the miles separate friends and relatives. A help beyond measure when you need doctor, veterinarian, or the assistance of a neighbor.
It's easier to get things done with a telephone.
BELL TELEPHONE SYSTEM

Here and There in the Field

Special Equipment for Partially-Deaf Persons

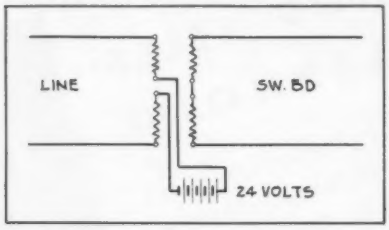
Having had requests from several subscribers, suffering from partial deafness, for special equipment to help them overcome their handicap, we set about designing a simple instrument, for common battery service, that could be constructed of standard parts obtainable at any well-supplied radio wholesaler. The only telephone parts used are a low-resistance relay and a seven-point connecting block.



Connection of Converter Coil for Adapting Amplifier to Magneto Telephones. Almost Any Ring-Through Repeating Coil Will Serve the Purpose.

The amplifier housing is a crackle-finished steel cabinet 7½ ins. by 7 ins. by 14 ins. with a hinged top and a false bottom, permitting the use of subpanel wiring. The relay is also mounted beneath the false bottom.

This cabinet permits the use of two No. 6 dry cells for lighting the filament of the No. 30 tube. Except with very heavy users, a standard 4½-volt, C battery will serve the purpose. In this case a cabinet only 10 inches long may be used. If a 4½-volt battery is used, connections should be made to the 3-volt terminals.

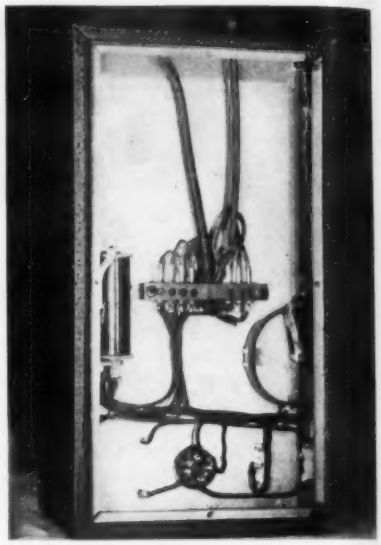


Constructional Details of Special Telephone Equipment for Subscribers Suffering from Partial Deafness, as Seen From Top of Cabinet.

The constructional details are shown in the accompanying illustrations. One of them shows a top view and another a view of the wiring from the bottom. A two-conductor cord connects the amplifier to the line and a five-conductor cord connects it to a common battery handset instrument.

The circuit shown in the accompanying diagram is for a Monophone, but any handset instrument having an anti-side tone circuit and a dial blank should be adaptable to the circuit.

The volume control is mounted on the dial blank. Aside from the connections to this control, the only change made in the telephone is the removal of the brown conductor of the handpiece cord from *R* to the extra line post shown connected to the middle point of the control.



View of the Equipment As Seen from the Bottom of the Cabinet.

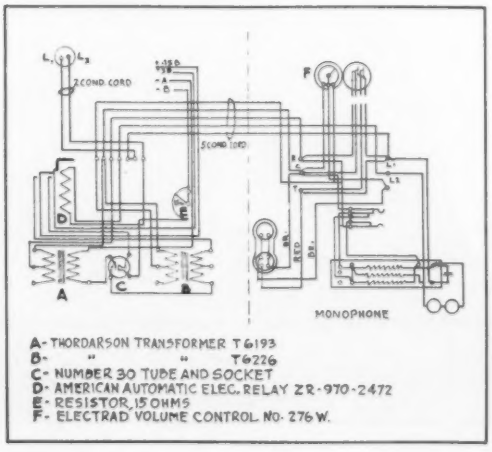
A list of the parts used follows:

A—Thordarson transformer T6193.
B—Thordarson transformer T6226.
C—No. 30 tube and socket.
D—American Automatic Electric relay ZR-970-2472.
E—Resistor, 15 ohms.
F—Electrad volume control No. 276W.

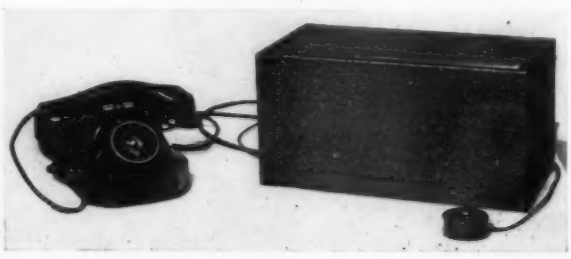
On the line side of both of the transformers the 125-ohm windings are used.

The wholesale cost of the material for the amplifier is approximately $15. The labor cost should not be more than $5, making the total cost $20.

We find that those of our subscribers who have need for this hearing aid are willing to pay a monthly rental sufficient to yield a good rate on the money invested. (*Concluded on page* 26)


2 COND. CORD
5 COND. CORD
MONOPHONE
A- THORDARSON TRANSFORMER T6193
B- " " T6226
C- NUMBER 30 TUBE AND SOCKET
D- AMERICAN AUTOMATIC ELEC. RELAY ZR-970-2472
E- RESISTOR, 15 OHMS
F- ELECTRAD VOLUME CONTROL NO. 276 W.

To the Left Is Shown the Circuit for Special Telephone Equipment for Subscribers Who Are Partially Deaf. This Is Designed for a Special Make of Handset But Any Instrument Having an Anti-Sidetone Circuit and a Dial Blank Should be Adaptable. Below Is Shown the Equipment With the Amplifier Housed in a Crackle-Finished Steel Cabinet.



TELERING

ECONOMY ◆ RELIABILITY

Order One NOW for a 30-day Free Trial

ONLY ONE CONTACT!

PRICE $44.00 EACH
F. O. B. Elyria

Reliable ringing service is essential in providing satisfactory telephone service.

Use TELERING and provide the MOST reliable service at the LEAST cost.

Current Consumption negligible.

Positively No Radio Interference

Directly converts Commercial Alternating Current to Telephone Ringing Current.

You can always depend upon our full co-operation and prompt service.

Sold by Leading Telephone Distributors

TELKOR, Inc., ELYRIA, OHIO

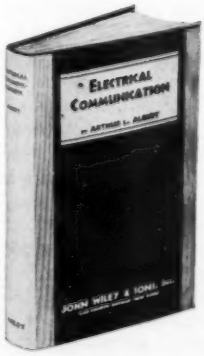
Discusses the entire industry!

ELECTRICAL COMMUNICATION

By ARTHUR L. ALBERT

Associate Professor of Communication Engineering, Oregon State College

A study of the various specialized phases of electrical communication as related to the usages of modern communication systems. This book presents not only theory but a discussion of the entire industry. Although not highly mathematical, the treatment is exact, up-to-date, and in accord with the highest engineering standards. The communication engineer will find this book a valuable addition to his working reference library.



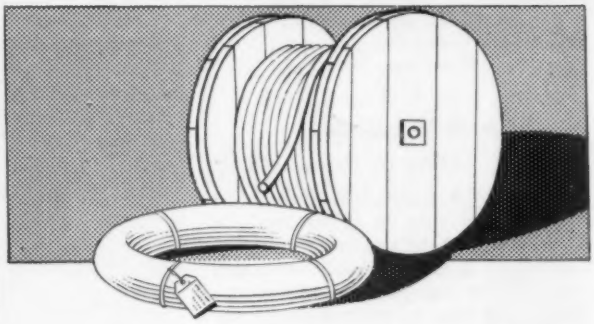
448 Pages 6 by 9

$5.00

TELEPHONY PUBLISHING CORPORATION

Telephone Wabash 8604 608 S. Dearborn St., Chicago

PHILLIPS



FOR EVERY TYPE OF WIRE AND CABLE

Phillips products include every type of wire and cable required for telephone, telegraph and power work.

Made in the most modern of shops by workmen long experienced in the fabrication of only the highest quality products, Phillips wires, cords and cables may be relied upon to deliver the maximum in reliability and performance under all conditions.

Telephone administrators are invited to try Phillips products under actual working conditions and experience first hand the outstanding merit and long-lived dependability for which they are noted. Prices and full information gladly sent upon request.

Phillips Products Also Include:

A complete range of telephone instruments, telephone switching equipment for public and private exchanges, and telephone protective apparatus.

PHILLIPS ELECTRICAL WORKS LIMITED

ESTABLISHED 1899

BROCKVILLE, ONTARIN, CANADA

Factories: Montreal and Brockville. Cable Address: Phillelec, Brockville. Distributors for Canada: Canadian Telephones & Supplies, Limited, Toronto, Winnipeg, Montreal, Regina and Vancouver.

For service with a magneto switchboard I would recommend the use of a "converter" coil and a 24-volt dry battery at the office. If the subscriber is not a heavy user, a 22½-volt B battery might be used. The amplifier could be converted to local battery but that would add complications to the equipment.

LESTER D. MEYERS, *Supt.*
Boyer Valley Telephone Co.,
Woodbine, Iowa

▼ ▼

Inventor of Wireless Dies in Rome, Italy

Guglielmo Marconi, inventor of the wireless, died July 20 at his home in Rome, Italy, at the age of 63 years, as a result of a heart attack. Although not well for the past two years, he had of late been in good health. Only three days prior to his death he had motored to Castel Gondolfo and had a long audience with Pope Pius XI regarding the new high-powered radio station which Mr. Marconi was constructing at the Vatican. He was born in Bologna, Italy, April 25, 1874.

Forty-two years ago Mr. Marconi made a simple announcement which has since transformed communication and made the nations of the world neighbors to one another: "I have discovered how to telegraph without wires."

Within a decade thereafter ocean liners were keeping in touch with one another and with the mainland by means of "Marconigrams." He sent his first wireless message across the Atlantic Ocean from England to Newfoundland, December 12, 1901. Commercial wireless service was inaugurated between England and Canada the following year, and between the United States and Europe in 1907.

In 1909, Mr. Marconi was awarded the Nobel prize for his contributions to the science of physics. Most symbolic of all his honors was a gold medal presented by survivors of the Titanic who owed their lives to his invention. The Titanic was the first great ship to flash an SOS over Marconi's wireless and since then it has saved the lives of thousands of ship-wrecked persons.

Mr. Marconi helped develop the vacuum tube which made possible the wireless transmission of the human voice. With the adaptation of the wireless to transmission of the human voice, and the combination of wireless and wire telephone, Marconi's invention became one of the great boons of civilization.

Mr. Marconi was only 21 years old when in the spring of 1895 he first tapped out the three dots of the letter "S" in the Morse code on a wireless transmitter in the laboratory set up in his barn and laconically made the announcement of his discovery to a skeptical world.

Italy failed to appreciate the usefulness of the young inventor's discovery. As a result his Anglo-Irish mother took him to England where, with the aid of her relatives, he was granted the first patent for a practical system of wireless telephony, in 1896. By 1919 not only were ships at sea communicating with each other by wireless but airplanes were being directed by this unique means of communication. The wireless was also being used in protecting forests against fires.

One of Many Public Telephones Located at Various Points on the Important Alpine Passes in Switzerland by the Swiss Automobile Club for the Safety and Convenience of Passing Motorists, Bicyclists and Hikers. Persons in Danger or Distress of Any Kind Can Thus Avail Themselves of the Opportunity to Call for the Services of a Garage, the Police or a Physician.

In 1920 the wireless was combined with wire telephony in a demonstration between London, England, and Amsterdam, Netherlands (TELEPHONY, January 21, 1922.) On May 30, 1924, Mr. Marconi transmitted the human voice from England to Australia. It was in the autumn of that year that he discovered waves of 32 meters or less could be used to transmit and receive messages at maximum distances during the day. The development of wired-wireless or radiotelephony, as it is now called, in subsequent years, is too familiar to require recounting.

At the time of his death, Mr. Marconi was working on different developments of the principle he discovered: Television, especially with the use of ultra short waves; further developments of the micro-wave, a new type radio transmitter for airplanes. Much of his work had been devoted to military purposes in the last few years and he had been repeatedly reported at work on a "death ray." This, however, was denied as frequently as it was reported.

Mr. Marconi spent the last five or six years experimenting with micro-waves. He was convinced that tumors could be treated internally without the surgeon's knife and that cold in the kidneys and other organs could be treated with micro-waves.

The "radio wizard," as he was called, was a great dreamer. He talked reticently about his own achievements. Few men knew him intimately. He hated publicity but loved luxury. He spoke slowly, quietly and was unassuming.

▼ ▼

First Maryland Telephone Placed in State Museum

With the recent remodeling of the executive mansion at Annapolis, Md., the first telephone to be installed in that historic city, 53 years ago, has been removed to a place of honor in the Museum of the Maryland Historical Society. "Annapolis one" was the number of this special "cabinet-type" telephone, which played an important part in the affairs of state, as directed by 11 chief executives of Maryland for more than half a century.

In 1884 Gov. Robert M. McLane in person witnessed the installation of this telephone which, by the way, was no ordinary type of instrument but one designed and installed for important people only. He was shown how he could pull a chair up to the desk-like instrument and speak into the transmitter mounted on a curving iron gooseneck, rising out of the desk top. On the left side of the desk hung a receiver and on the right was a little crank. In the space which in an ordinary desk would hold papers, pens and ink, was a glass-enclosed cabinet inside which could be seen the inner workings of the instrument. On the shelf over this were two nickel-plated bells.

When Governor McLane first used the instrument, he heard the operator's voice coming to him from Baltimore, as there was no central office in Annapolis at the time.

Now, with the remodeling of the executive mansion, this famous old telephone has given way to more modern instruments, and no longer will it help with the activities of Maryland executives. Its bells are silenced. Quietly it takes its place among other objects of history, after 50 years in the executive mansion.

Commission and Court Activities

Commission Upheld in Voiding Coin Box Ordinance

Judge R. M. Mann of the state circuit court, Little Rock, Ark., on June 29, upheld the Arkansas Department of Public Utilities in abrogating a Fort Smith city ordinance which would have prohibited the Southwestern Bell Telephone Co. from installing coin box telephones except for long distance calls and would have required the company to install telephones at the usual business rate in any place.

The order was made in a petition for a writ of certiorari filed by the city in which the court was requested to set aside the order of the utilities commission. Judge Mann ruled against the city. The telephone company had filed an intervention. The Fort Smith ordinance, passed June 23, last year, was nullified by the utilities commission on appeal by the Southwestern Bell company which claimed the city was without authority to pass the ordinance, and that it was unconstitutional and discriminatory. The commission held that the ordinance would increase rates to residential patrons on account of free telephone service in downtown stores.

It was contended by Madjo Cravens, Fort Smith city attorney, that the utilities commission is without judicial authority to invalidate an ordinance. In his finding, the commission said its action was legislative, and not judicial, in that it had established a rate for telephone service.

Attorneys for the city of Fort Smith are said to be preparing an appeal from Judge Mann's decision to the state supreme court.

▼ ▼

Approves REA Project, Retains Jurisdiction

Attorney Van Pelt for the Eastern Nebraska Public Power District said that he was informed by Engineer Henningson that REA had advised him that where construction of rural electrification pole lines caused inductive interference to the service of farmers' mutual telephone companies having only grounded lines, REA will pay for the cost of material for reconstruction into metallic lines but that the mutuals must pay for labor costs.

This is on the theory that these companies, being mutual in character, have only limited power to secure necessary funds and must be aided in part, in order that they might continue giving service.

The Nebraska State Railway Commission said that it would approve the project but would retain jurisdiction in order to be able to enforce proper construction that would result in protecting against interference.

▼ ▼

Ask Abolition of Exchange Toll Charge

A petition signed by 100 subscribers of the Platte Valley Telephone Corp. has been filed with the Nebraska State Railway Commission asking that it order the abolition of a 10-cent toll charge from Mitchell to Scottsbluff and of a 15-cent charge from Mitchell to Gering. The petitioners claim that they are entitled to free service for the reason that as the schedule is applied and the exchange territory laid out, neighbors often have to pay to call up one another.

▼ ▼

Seeks to Restrain Interference with Financing

The case of the Pacific Telephone & Telegraph Co. against the Public Utilities Commissioner of Oregon, in which an injunction is sought restraining the defendant from interfering with the inter-organization financing of the plaintiff was submitted on stipulation of fact, June 16. It was submitted to Federal Judge Fee without trial.

It is charged that the commissioner overstepped his authority in interfering with its loans and other financial transactions between the company, its parent company, the American Telephone & Telegraph Co., its subsidiary companies, and the Bankers Trust Co. Some of the amounts involved ran over $5,000,000.

▼ ▼

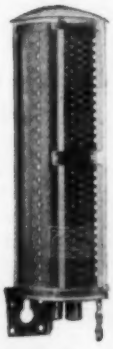
Further Commission Hearing in Wisconsin Rate Case

Before returning the Wisconsin Telephone Co. rate case to Dane County Circuit Court for decision, the Wisconsin Public Service Commission held a further hearing July 22 in Madison for "the reception of such further evidence and argument as the parties and other persons interested may desire to present," the notice of the hearing declared.

The company appealed in Dane

COOK

M-16 TERMINALS



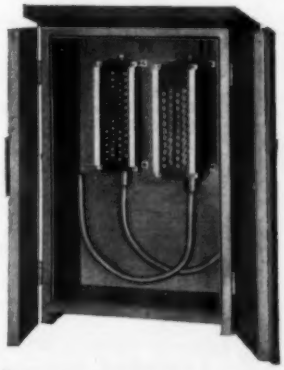
Made in 11, 16, 26 and 52 pair sizes as illustrated.

A sealer cable chamber terminal arranged for multiple cable nozzles. To be used as a test for either aerial or underground cable. Full cross connection and drop distribution provided.

The terminal is furnished mounted in a wood or metal housing, as illustrated, when specified.

An ideal terminal for rural cable between unattended exchanges or as a junction point of aerial and underground cable. Base, corebox and self-soldering nozzles are of steel, formed and hot galvanized. Face plate is of moulded bakelite. Studs, nuts and washers are of Everdur metal. Hood is of steel, hot galvanized.

Made in 16 to 404 pairs mounted in pole houses.



COOK ELECTRIC CO.
2700 Southport Ave. Chicago

Always Specify COOK PROTECTION

County Circuit Court from three orders of the commission issued in a rate investigation of the company. Additional testimony in hearings stretching over several months was taken in court before Judge A. C. Hoppmann and the case was therefore sent back to the commission to decide whether it wished to change its orders in view of the additional testimony.

▼ ▼

Denied Intervention in Cleveland, Ohio, Case

The Ohio Public Utilities Commission, by purely formal entry July 14, denied the application of Jack B. Dworken, Cleveland attorney, for leave to intervene in the Cleveland suspended rate case of the Ohio Bell Telephone Co. now incorporated with the state-wide rate case.

▼ ▼

"Depression" Rates Inadequate; Ask Increases

Several small telephone companies have filed applications for rate increases with the Wisconsin Public Service Commission which, the commission cites, is evidence of changing economic conditions in that state. Among the companies applying is the Cuba Telephone Co. which seeks to increase its quarterly rate from $3.75 to $5.25 gross.

The commission pointed out that many small telephone companies, to keep subscribers during the depression, adopted temporary emergency reduced rates which did not usually earn the companies a fair return. With improved economic conditions, these small companies now want increased rates to allow for wage increases, to take care of deferred maintenance and to provide a more adequate return.

▼ ▼

Rates Increased; Handset Charge Dropped

The Manawa Telephone Co. is the first telephone utility in Wisconsin to furnish handset telephones with no extra charge, the Wisconsin Public Service Commission announced June 25 in connection with a $650 increase in Manawa telephone rates.

By the increase, considered justified by the commission because of low earnings, Manawa residence service will be $2.20 for one-party, $1.90 for two-party, and $1.65 for four-party service with the choice of wall or handset telephones. Desk sets are not used by the company.

▼ ▼

Says Rural Rates Should Not Be Based on Cost

The Wisconsin Public Service Commission, in granting a slight increase in rural rates to the Commonwealth Telephone Co. at Jackson and Newburg, Wis., switched at West Bend by the Wisconsin Telephone Co., said it does not concede the company's contention that rural service should be determined upon cost of service.

"Rates to rural customers based on costs may be higher than economically or socially justified," the commission declared. "Telephone service consists of communication between persons, and both the urban resident and the farmer derive value from being able to communicate freely with each other."

The 64 rural customers switched at West Bend will pay $2 a month hereafter, as do Allenton customers, but not until the company has rebuilt its lines and improved service, the commission ruled. This raise in rates, which will increase company revenues by $417 a year, is not expected to yield a return on the investment.

▼ ▼

May Increase Business Rates On Modernization of Plant

The Minnesota Railroad & Warehouse Commission, on June 22, authorized the Northwestern Bell Telephone Co. to increase its one-party business rate at Roseau from $2.50 to $3 per month and to establish a two-party business rate of $2.50, upon the conversion of the plant to common battery operation. Permission to increase one-party residence rates from $1.50 to $1.75 per month, to establish a two-party residence rate at $1.50, to increase the four-party residence rate from $1 to $1.25 and to increase the multi-party rural residence service from $1.26 to $1.50 was denied.

The commission found that the charge for uncollectibles will be $11 less than the company allowed, that maintenance expense will be $332 less than the company's estimate, that a composite depreciation rate of 3.92 per cent will be adequate, in place of 5.22 per cent as used by the company. This will produce a charge $256 less than that estimated by the company.

For commercial expense the commission allowed $155 less than the company's estimate, basing its estimate on the average cost for the years 1933 to 1936, inclusive. It allowed 1½ per cent license fees to the American Telephone & Telegraph Co., although it states that "the propriety and legality of this charge is questionable and under investigation by the Federal Communications Commission."

The commission found that exchange facilities at Roseau should be compensated at the rate of 2.5 cents per call for each originating toll message and that, based on 1935 toll business, this would provide an annual rent compensation of $205. For rate-making purposes the commission found the fair value of the exchange properties, reconstructed in harmony with the plan presented by the company, would be $32,080. Disallowing any increase in village and rural residence rates, the net income will be $1,821, or approximately 5.7 per cent of the fair value of the properties.

Evidence of record shows subscribers had complained of poor and unsatis-

Answers to the Traffic Questions on Page 16

1. Yes.
2. The word "Hello" should never be used by an operator under any condition. The *office name* should be used in answering incoming calls.
3. An eight-hour day is a standard operator's trick. It is advisable to give a 15-minute relief period each half trick.
4. Ten minutes.
5. Yes.

factory service, both local and long distance toll and that, after an investigation the company prepared to make repairs. A conference between representatives of the company and business subscribers of Roseau resulted in an agreement that more satisfactory service would be obtained if the property were reconstructed and converted from magneto to common battery service.

The company pointed out that the change would involve the purchase of an additional lot, construction of a new office building, installation of a new common battery central office equipment, station apparatus, a rearrangement of pole lines and the installation of additional aerial and underground cable. It estimated the cost of the converted plant to be $35,913, but the commission found the cost to be $32,080, as mentioned previously.

COMING CONVENTIONS

Michigan Independent Telephone Association, Olds Hotel, Lansing, July 28 and 29.

The Illinois Telephone Association, Hotel Pere Marquette, Peoria, September 22 and 23.

Independent Pioneer Telephone Association of the United States, Hotel Stevens, Chicago, October 14.

United States Independent Telephone Association, Hotel Stevens, Chicago, October 12, 13, 14 and 15.

▼ ▼

New York Telephone Co. Seeks Assessment Reduction

A test case of statewide importance in the determination of the status of telephone equipment under the tax laws was on trial in Syracuse, N. Y., on July 7, in certiorari proceedings brought against the city by the New York Telephone Co., seeking a reduction of $467,620 in the assessment of the company's exchange at 321-325 Montgomery street.

The city assessed the land at $65,825, the building at $245,000 and the exchange equipment in the building at $651,000. The reduction asked by the company would make the total assessment $494,205.

The company contends that most of the equipment is non-taxable on the ground that it is portable apparatus only, while the city contends that the equipment is so closely attached to the building structurally and so essential to the exchange that it is, in fact and law, part of the real estate.

If the company wins, it is understood, the decision here will be used to obtain reductions in assessments all over New York State, trimming many millions off the assessment value of the company's properties.

Charles Lucke, of Albany, telephone company was on the stand July 7 before Referee James F. Brazell at a court house hearing. He was questioned by former Senator George R. Fearon and John T. Smith.

Edward L. Blackman and Frank A. Fritz, company attorneys, both of New York, were also present. The case was referred by Supreme Court Justice Frank J. Cregg.

▼ ▼

Summary of Commission Rulings and Hearings

Federal Communications Commission
Washington, D. C.

July 7: Telephone wire certificate filed with the telephone division by the Inter-Mountain Telephone Co. requesting authority to construct a .104 copper toll circuit from Fort Chiswell to Galax, Va., a distance of approximately 33 miles.

July 7: Telephone wire certificate filed with the telephone division by the Northwestern Bell Telephone Co. requesting authority to supplement existing facilities between Winona, Minn., and La Crosse, Wis.

July 8: Telephone wire certificate filed with the telephone division by the New England Telephone & Telegraph Co. requesting authority to supplement existing facilities between Fitchburg and Greenfield, Mass.

July 29: Hearing before telephone division, postponed to this date from July 19, on the application of the American Telephone & Telegraph to test transatlantic radiotelephone service to several major European countries.

August 2: Further hearing before an examiner to determine whether the Champaign Telephone Co., Urbana, Ohio, comes under the complete jurisdiction of the commission.

August 10: Hearing before telephone division, postponed to this date from July 26, on application of the American Telephone & Telegraph Co. for two new transatlantic radiotelephone stations at Lawrenceville, N. J., with two additional frequencies.

Illinois Commerce Commission

July 14: The Illinois Iowa Power Co. was directed to file a new rate schedule by July 26 on wholesale electric service furnished to the Central Illinois Telephone Co. The telephone company sought permission some time ago to build a transmission line which would enable it to purchase power from the municipal plant in Springfield, Ill., contending that it would effect a saving thereby.

The commission held that the power company should be given an opportunity first to submit a new rate schedule.

July 20: Hearing in Springfield on application of the Chesterfield-Medora Telephone Co. for an order authorizing the issue of 200 shares of its no par value capital stock; also for an order authorizing purchase of the Chesterfield Telephone Co. now in hands of receiv-

(*Please turn to page* 32)

SANDS

TYPE 40 PROTECTED CABLE TERMINAL

A compact, small-capacity unit arranged for pole or wall mounting. The reversible zinc cover allows cable to be led from top or bottom. Each pair of protectors consists of two Type 17, 5-ampere wood fuses and two Type 2105 discharge blocks. Available in capacities of 3, 5 and 7 pairs. Information on this and other Sands protective equipment gladly supplied upon request.

SANDS PROTECTION EQUIPMENT
is made by:

AUTOMATIC ELECTRIC COMPANY

Distributed by:
AMERICAN AUTOMATIC ELECTRIC SALES CO.
1033 West Van Buren Street, Chicago
Export Distributors:
AUTOMATIC ELECTRIC SALES COMPANY, LTD.
Chicago

Theory and Practice of the Magneto Telephone Exchange (Ctd.)

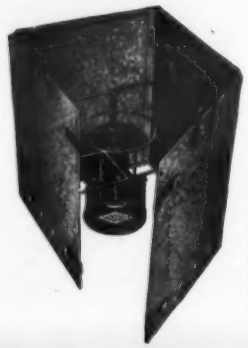
Detailed Circuit Features of Magneto Cord Circuits

We have stated that there are three basic types of cord circuits: the simple cord circuit, the repeating coil cord circuit and the condenser type cord circuit. Of the three types the repeating coil cord circuit is the most satisfactory from all standpoints, with the possible exception of its higher cost.

Let us now examine in greater detail the characteristics of typical cord circuits. A cord circuit may be thought of as having four separate functions: (1) voice transmission between subscribers, (2) signaling of the called subscriber by the operator, (3) supervisory signals to indicate the completion of a call or the desire of one of the subscribers to signal the operator after a connection is established, and (4) listening, talking, and monitoring features on the part of the operator.

We have already discussed how transmission takes place in each of the three types of cord circuits. Let us next consider in detail the cord circuit shown in Fig. 59. This is a typical repeating coil type magneto cord circuit with double drop supervision.

It will be observed that the supervisory drops are bridged directly across the two mf. condensers so that they operate by virtue of the *voltage drop* occurring across these condensers. The repeating coils are so designed that they are



Unique Folding Windshield

protects the furnace from wind—and the public from danger.

A protected spot for tools and accessories while working.

Three styles:

No. 50 4 sided with grate...$11.48
No. 50-A 4 sided, no grate... 7.50
No. 50-C 3 sided, no grate... 5.25

UNIQUE: Furnaces, Blow Torches, Tent Heaters, Ladles, Solder Copper Handles, Wiping Cloths, Pots. May we send literature?

UNIQUE MFG. CO., Inc.
221 Whiting St., Chicago

very inefficient at 20 cycles; hence, very little ringing power passes from one winding to the other.

The shutter of each supervisory drop is so arranged that, in falling, it closes a contact in a *night alarm circuit*. The night alarm circuit, which will later be described in detail,

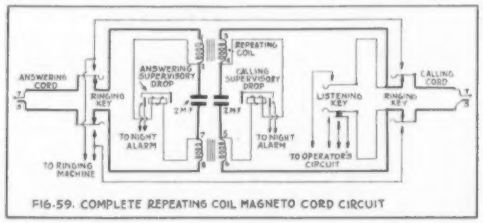


FIG. 59. COMPLETE REPEATING COIL MAGNETO CORD CIRCUIT

is for the purpose of signaling the operator (when she is not at the switchboard) and either the answering or calling party signals the operator after a connection has been established.

The cord circuit shown is provided with two keys—one a *listening key* for the operator's set and the other a *ringing key*. The latter, if thrown forward, rings on the calling cord; if thrown backwards—that is, toward the operator—it rings on the answering cord.

Study of Circuit Will Show Generator Connection

A study of the circuit will show that, when ringing on the calling cord, a generator is connected directly to this cord and the connection to the answering cord is temporarily broken during the ringing interval. The same is true in ringing on the answering cord except that in this instance, the connection looking toward the calling cord is open.

When the listening key is thrown forward, the operator's telephone set is connected directly across the cord and, at the same time, the transmitter circuit is closed so that current flows through the transmitter. This latter feature results in a saving of battery power, inasmuch as current is drawn from the battery only when the operator has her set cut in on the circuit due to operation of the listening key.

The operator's telephone circuit, which is somewhat different from the regular telephone circuit, will be discussed later. It will be observed in this particular cord circuit

that a two-connector type of plug is used, the plug terminals being designated as "tip" and "sleeve."

Cord Circuits with Lamp Supervision

Modern switchboards are available with what is known as *lamp supervision* on the answering and calling cords. The chief advantage of lamp supervision over drop type supervision is that a lamp signal will attract the operator's attention more readily than does the drop type signal.

Lamp signals are considered by some as requiring less maintenance than drops.

A study of the circuit shown in Fig. 60 will show that a two-winding relay is used, one winding being connected directly across the 2 mf. condenser the same as is the case with the supervisory drop, while the other winding is so arranged that when the armature of the double-wound relay is attracted, due to the subscriber attempting to signal the operator, a contact is closed which passes current through the supervisory lamp, the relay winding, and back through a closed contact on the listening key.

The direct current passing through the second winding of the double-wound relay causes the armature to be "locked up." The lamp will remain lighted until the operator throws the listening key forward, disconnecting the ground and thus causing the armature to fall back and extinguish the lamp.

The operator's listening key shown in Fig. 60 is somewhat different from that in Fig. 59 in that, due to the use

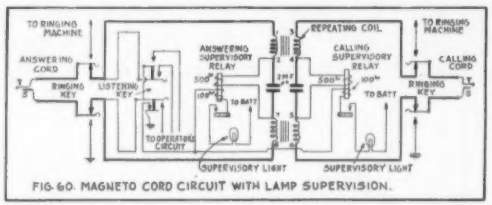


FIG. 60. MAGNETO CORD CIRCUIT WITH LAMP SUPERVISION.

of a supervisory lamp, it is necessary to have a storage battery available for current; hence, the same storage battery can be utilized for operating the operator's transmitter and a slightly different circuit is thus required than that where a local battery circuit is used. The ringing and ring-back key arrangement in this circuit is identical with that previously described.

The Manufacturers' Department

Automatic Exhibit at Office Management Convention

American Automatic Electric Sales Co., Chicago, presented an attractive exhibit at the convention of the Office Management Association, which was held in Hotel Stevens, Chicago, June 7, 8, and 9. Against a setting in pastel shades, the value of the telephone in the office was brought out by the display of an automatic switchboard, with several telephones, the new "autodial," a code call unit, and an executive loudspeaker station, connected and in operation.

Attractive Exhibit of American Automatic Electric Sales Co. at Office Management Convention Showing Handsets in Pastel Colors and Other Equipment.

The beauty of modern telephones was shown by the display of a number of monophones in art shades. The display included also a Burns office desk, complete with a Burns posture chair, and various other items from the "Burns" line of office equipment.

▼ ▼

Heavy Duty Fire Extinguisher for Trucks

Heavy vehicle type Pyrene fire extinguishers with special "shock absorber" construction to withstand excessive vibration and fitted with specially-built sturdy steel brackets in two styles for truck and bus equipment are announced by Pyrene Mfg. Co. One bracket is for mounting the extinguisher on the steering post and the other for any position on the dash or inside of cab.

In addition to the conventional retaining cup at bottom and top spring clips at top, these brackets hold the extinguisher firmly and securely by a metal strap extending around the extinguisher with quick-opening spring buckle which readily and instantly releases in an emergency. The manufacturers are already supplying these extinguishers and brackets to common and contract carriers who come under the new I. C. C. safety equipment regulations and various state regulations.

▲ ▲

New Ground Rods Designed for Great Depth

Sectional Copperweld ground rods and couplings for deep, low-resistance grounds are a new development, announced by the Copperweld Steel Co. of Glassport, Pa. Cold-drawn for rigidity, the Copperweld rod sections are threaded on both ends and joined as they are driven by means of a threaded bronze coupling.

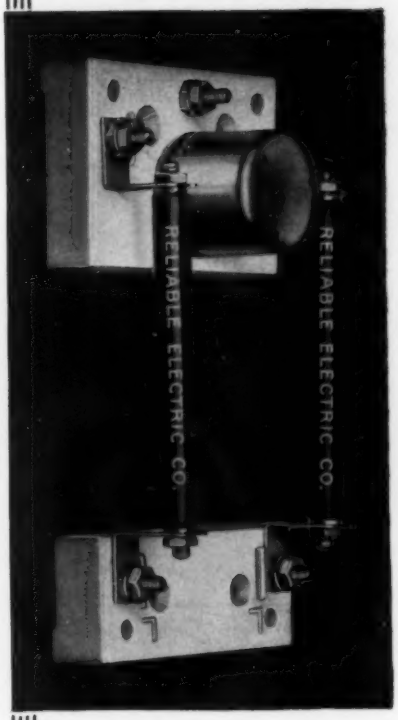
It is claimed that sectional copperweld rods may easily be driven to depths of 40 or 50 feet.

▼ ▼

Death of Stromberg-Carlson's Chicago Credit Manager

Charles Boberg, for many years credit manager of Stromberg-Carlson's Chicago office, passed away at his home Thursday, June 24.

Reliable



NO. 977HH INDOOR PROTECTOR

•

This sub-station protector is a standard of many operating companies.

It has a special low absorption porcelain base, phosphor bronze fuse clips and springs, and heavy binding posts with treated studs.

A nickeled brass screw cover encloses the discharge blocks.

Write for samples and further information.

•

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES

UNIQUE MFG. CO., Inc.
221 Whiting St., Chicago

Rates for

ADVERTISEMENTS

in this section

furnished upon request

CABLE—LEAD ENCASED

Kennecott Wire and Cable Company, Subsidiary of Kennecott Copper Corporation, Phillipsdale, R. I.—Paper telephone cable, switchboard cable, bare copper wire. Chicago: 140 South Dearborn Street; Cincinnati: Traction Building; New York: 10 East 40th Street.

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

MacGillis & Gibbs Company, Milwaukee, Wis.—Northern White and Western Red Cedar Poles. Plain or butt-treated. Immediate quotations on request.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

H. Sigalet & Company, Ltd., Lumby, B. C., Canada—Western Red Cedar Poles. Plain or butt-treated.

Valentine Clark Corporation, 2516 Doswell Ave., St. Paul, Minn.—Finished Cedar Poles. Plain or butt-treated.

COMMISSION RULINGS AND HEARINGS

(*Concluded from page* 29)

ers; also for authority to issue its first mortgage bonds of $20,000; also for a certificate of convenience and necessity to operate a public utility in the villages of Chesterfield, Medora, Hettick and Rockbridge and vicinity.

July 20: Hearing in Springfield on application of the Illinois Commercial Telephone Co. for authority to operate certain telephone property of the former Carman Mutual Telephone Co. in Henderson County.

July 21: Hearing in Springfield on joint application of the Central Illinois Public Service Co. and Illinois Bell Telephone Co. for approval by first party to second party of lease of certain property in city of Springfield.

July 21: Hearing in Springfield on complaint of The Kiwanis Club of Vienna against the Illinois Commercial Telephone Co. as to telephone service and equipment by respondent in Vienna.

Missouri Public Service Commission

July 16: Application filed by D. C. Myers for authority to lease the telephone exchanges located at Green City, Green Castle and Pollock, to Mr. and Mrs. J. R. Chapman.

Nebraska State Railway Commission

July 12: Complaint filed by A. G. Scheel, lumberman at Pleasant Dale where Lincoln Telephone & Telegraph Co. maintains an exchange, asking that the company be ordered to give him connections with a farm line connected only with the Lincoln exchange, which will give him service upon the latter; farm line a relic of old conditions which company is endeavoring to eliminate as unprofitable.

July 16: On motion of Commissioner Maupin the secretary was directed to inform the Federal Communications Commission that the Nebraska commission offers no objection to the application of the Nebraska Continental Telephone Co. for a certificate of convenience and necessity to acquire the telephone line system, business and assets now owned and operated by the Nebraska Continental Telephone Corp., and that a copy of the state commission order therein be forwarded to the Federal commission. (A refinancing plan entirely.)

New York Public Service Commission

July 1: Formal petition filed by the Middleburg Telephone Co. for permission to issue $12,000 of common capital stock.

July 20: Hearing in Jamestown before Telephone Engineer W. E. Hinman on petition of the Jamestown Telephone Corp. for consent to transfer a portion of its property to the Central Chautauqua Telephone Co.

Ohio Public Utilities Commission

July 12: Authority granted the Star Telephone Co. of Ashland, to issue and sell at par 1,768 shares of common stock to reimburse its treasury to the amount of $88,397.37 uncapitalized capital expenditures.

In granting such authority the commission denied the company's application filed May 13, 1935, and the supplements thereto, insofar as it sought permission to issue 2,352 shares of $50 par value common stock to reimburse its treasury to the amount of $117,621.29.

July 12: The secretary of the commission certified a report upon the application of the Frazeysburg Home Telephone Co. to increase its rates as follows:

Business independent, $2.50 to $4.25; business two-party, $2.00 to $3.75; business rural, $2.00 to $3.50; residence independent, $1.75 to $2.75; residence five-party $1.25 to $1.75 and residence rural $1.50 to $1.75.

Finding that with a valuation of $71,487.69 and an allowance of 5 per cent of the value of depreciable property, the company will under the new rates have an annual income of $464.68 or a return of .065 per cent. The company claimed a deficit of $1,111.77 under the existing rates. The report closes with a recommendation that the application be favorably considered.

July 14: By purely formal entry, the commission denied the application of Jack B. Dworken, of Cleveland, for leave to intervene in the Cleveland suspended rate case of the Ohio Bell Telephone Co. now joined with the statewide rate case.

South Dakota Board of Railroad Commissioners

July 16: Order issued approving application of the Northwestern Bell Telephone Co. and the Dakota Central Telephone Co. for an order approving and establishing a schedule of commissions or terminal fees for toll messages.

Wisconsin Public Service Commission

June 30: Joint application filed by the Wisconsin Telephone Co. for permission to purchase and the Porter Telephone Co. to sell the line which extends east of McDill, furnishing service to 12 roadside subscribers served through the Wisconsin company's switchboard at Stevens Point.

July 9: Application filed by the Borst Valley Telephone Co. for permission to abandon certain lines in the town of Chimney Rock and by the Community Telephone Co. for permission to abandon a line in the town of Montana.

July 22: Further hearing in Madison in the Wisconsin Telephone Co. rate case before returning it to Dane County Circuit Court for decision. The case was returned to the commission to allow it to consider the additional testimony which has been presented before the court.

Condensed Telephone News

New Companies and Incorporations

EDDYVILLE, NEB.—The Southwestern Telephone Co., has been organized here with a capital of $1,400 to equip, own and operate a telephone system in Dawson county. B. Gomme is president; Charles Wiley, vice-president; Robert Hagen, general manager; John Schroder, secretary; and W. D. Williams, treasurer.

Franchises

EFFINGHAM, ILL.—The Illinois Bell Telephone Co. has asked for a 25-year franchise from the city of Effingham. The company has been operating in the city for a number of years without a franchise.

Telephones

COLORADO SPRINGS, COLO.—Installation of telephones in Colorado Springs shows an increase of approximately 6 per cent at this time of year, according to Eric C. Aaberg, district manager of the Mountain States Telephone & Telegraph Co. Mr. Aaberg reports that there are now 12,900 telephones compared to 12,000 on July 1 last year.

It is expected that the peak of installations will be reached about the end of July, according to Mr. Aaberg. There should be a considerable increase in number at that time over the present though the gain up to now has been exceptional. It is far above the number of telephones in use between 1931 and 1935.

MOLINE, ILL.—There are 640 more telephones in use in Moline this year than last, according to Ralph P. Haddick, manager of the Moline office of the Illinois Bell Telephone Co. The number of subscribers in East Moline also increased by 170 during the last 12 months.

New telephone directories contain the names of 6,750 subscribers in Moline.

NEW YORK, N. Y.—General Telephone Corp. reports for its subsidiaries a gain of 1,401 company-owned telephones for the month of June as compared with a gain of 596 telephones for June, 1936.

The gain for the first six months of 1937 totals 13,835 telephones, or 4.13 per cent, as compared with a gain of 10,555 telephones, or 3.38 per cent for the corresponding period of 1936. The subsidiaries now have in operation a total of 348,551 company-owned telephones.

NEW YORK, N. Y.—The Bell system in June had a net gain of 41,400 stations, against a gain of 25,600 in June last year and 95,000 in May, 1937.

Smaller gains shown in June this year and a year ago reflect seasonal trends, as with the start of the vacation season disconnections of residence telephones are substantial.

For the six months to June 30 the station gain for the Bell system was 527,000 telephones, against 378,300 in the like 1936 period.

NEW YORK, N. Y.—The New York Telephone Co. reports a net gain of 4,085 telephones in service in June, contrasted with a net loss of 1,745 stations in June, 1936, and a loss of 5,534 in June, 1935.

For the first six months of this year, the company showed a gain of 71,040 telephones in service, against a gain of 42,405 in the first half of last year and a gain of 8,318 stations in the same period of 1936.

CINCINNATI, OHIO—A net gain of approximately 6,000 stations by the Cincinnati & Suburban Bell Telephone Co. during the first six months of 1937 has been reported by the company. It was emphasized that the increase occurred despite the flood conditions in January and February. A goal for a net gain of 10,000 stations for this year was set during the latter part of 1936 by the company.

On June 30, the company had 173,084 stations. The highest number in operation was recorded in May, 1930, when the total reached 187,391 stations. The low point in recent years was in Janu-

JOHN C. LARKIN & COMPANY
Consulting
Accountants and Engineers
Specializing in a Professional Service to Telephone Utilities Covering the Field of Accounting and Engineering
Chamber of Commerce Building
Syracuse, New York

Frank F. Fowle & Co.
Electrical and Mechanical
ENGINEERS
35 East Wacker Drive CHICAGO

ACCOUNTING
HERDRICH and BOGGS
Certified Public Accountants
803 Electric Building
INDIANAPOLIS, IND.

PLANT ENGINEERING and CONSTRUCTION
Building and Rebuilding Telephone Plants
Consultation Services
Wiring Jobs, Installations, Switchboard Alterations
Expert Consultants on All Telephone Problems
National Engineering and Construction Co.
1031 West Van Buren Street
CHICAGO

Telephone Securities Corporation
120 So. La Salle St. Chicago, Ill.
Telephone Franklin 0181
Underwriters and distributors of securities of Independent telephone companies
Inquiries invited

J. G. WRAY & CO.
Telephone Engineers
Specialists in Appraisals, Rate Surveys, Financial Investigations, Organization, and Operation of Telephone Companies.
3324 Bankers Bldg., Chicago

Accounting, Tax and Rate Consultant
22 Years Continuous Contact with Telephone Organizations
C. B. RUSSELL
Interurban Bldg. Columbus, Ohio

Consulting Telephone Engineer
"Modernization of Equipment and Methods for Improved Service"
GARRISON BABCOCK
1104 Third Avenue, Seattle, Washington

TELEPHONY ADVERTISERS
will give you service which will be pleasing

ECONOMICAL
BURGESS TWIN-SIX BATTERY
Burgess Battery Company, Freeport, Illinois

CLASSIFIED SECTION

Rates 10 cents per word payable in advance.
Minimum charge $2.00 for 20 words or less.

RECONSTRUCTED EQUIPMENT

Kellogg No. 301 E 500-ohm self-restoring combine line drops and jack, 10 per strip @	$16.00
Western Elec. No. 22 3-bar Bdg. Gen. complete with crank and screws @	1.85
Leich Elec. Local or C. B. Transmitters with New mouthpiece and Back @	.90
Kellogg No. 729 S. A. Straight line C. B. wood hotel sets with Booster coil @	6.75
Kellogg No. 2696 4-bar 1000 or 1600 ohm Bdg. compacts with short arm @	3.00
Chicago Telo. Supply or Am. Elec. Receiver with repolished shell and new cords @	.90
Monarch No. 33 desk set with 3-bar 1000 or 1600 ohm inside connection signal set @	7.85
Automatic Elec. Co. 2 M. F. Condensers @	.35
Western Elec. No. 21 1 M. F. Condensers @	.35
Model No. 6 Style C. Flush type Calculagraphs, spring driven, @	26.50
New Cook No. 44 H Wall type Protector rack with GG No. 10 Cross connecting strip, 20-line units complete with Fuses and Carbons and mounting brackets @	7.50
New Kellogg C. B. or Magneto Grabaphones complete with 3 Cond. Cord less signal sets @	7.25
Western Elec. Cordless Visual signal C. B. PBX board with 7 local lines and 3 trunks complete with desk set Opr. set @	100.00
Chicago Telo. Supply Local Battery Ind. coil, 3 connection type @	.35

Write for Bulletin

REBUILT ELECTRIC EQUIPMENT CO.
1934 West 21st St., Pilsen Sta.
Chicago, Ill.

TELEPHONY ADVERTISERS
will give you service which will be pleasing

Coil Winding

Drop Coils
Ringer Coils
Induction Coils
Generator Armatures
Relay Coils

BUCKEYE TELEPHONE & SUPPLY CO.
COLUMBUS, OHIO

FOR SALE

Locate cable trouble the modern way with visual indication. Works with all cable testers. Write for complete information and prices. Jerry Canty, Hopkins, Mo.

POSITIONS WANTED

POSITION WANTED—Lineman or troubleman on magneto system; five years' experience in construction and maintenance. Best of references. Blair Quinn, Stratford, Iowa.

EXPERIENCED man and wife in telephone work want job in Kansas or Oklahoma. Can give good recommendations. Address A. R. Gately, Corbin, Kans.

WANTED—Cable splicing and switchboard work. Twenty years' experience with Bell and Independent companies. Have testing equipment. Best of references. Will go anywhere and handle any job, large or small. Address 8628, care of TELEPHONY.

POSITION with Independent company. Competent switchboard maintenance, installer, wire chief duties and outside plant. Address 8627, care of TELEPHONY.

MAN, age 32—Eight years' service Bell System. Complete knowledge Commercial Department. Believe greater opportunity Independent companies. References, present supervisor. Address 8622, care of TELEPHONY.

EXPERIENCED telephone man, 25 years in operating and rates, desires sales work or position with operating company. Good personality, conservative and reliable. Excellent references. Address B. H. Merriman, Pilgrim Hotel, Marshalltown, Iowa.

EXPERIENCED telephone and light manager, employed, desires position as traveling salesman. Technical training and experience. References furnished. Well known in telephone field. Write P. O. Box 83, Wilmar, Ark.

RURAL EXCHANGE—Chief operator experience; widow with daughter; refined personality; good health. Desire place with Christian people, living quarters. Middle states; consider anywhere. Best references. Address 8636, care of TELEPHONY.

WANTED—Employment in telephone field. Ten years' experience in construction, switchboard maintenance, cable splicing and general trouble shooting. Can furnish reference. Address 8583, care of TELEPHONY.

ary, 1930, when the number slumped to 148,035. The present gains showed a recovery of about 65 per cent of the stations lost during the depression period.

CLEVELAND, OHIO—The Ohio Bell Telephone Co. had 234,183 telephones in service in the local exchange and 670,053 telephones in the state as of June 29. This compares with 212,780 telephones in Cleveland and 598,114 in the state as of June 29, 1936.

BARTLESVILLE, OKLA.—The July telephone directory of Southwestern Bell Telephone Co. shows a total of 4,995 telephones, an increase of 245 telephones since the last listing, which was in September, 1936. The grand total increase for the entire year, from July 1, 1936, to June 30, 1937, was 326 telephones, according to Richard Hildebrand, general manager, as well as district manager, supervising 23 Bell exchanges in northeastern Oklahoma.

MILWAUKEE, WIS.—Telephone subscribers here have increased by 6,100 since the November issue of the telephone directory, acording to K. G. Williams, commercial manager of the Milwaukee office of the Wisconsin Telephone Co.

PITTSBURGH, PA.—The Bell Telephone Co. of Pennsylvania had a net gain of 1,329 telephones in service in the Pittsburgh district during June, compared with a gain of 1,200 in June, 1936. The net gain in Pittsburgh for the first six months was 9,831, compared with 5,832 in the corresponding period of 1936.

The company as a whole had a net gain of 44,610 during the first six months of 1937, compared with an increase of 25,863 for the 1936 six-months' period and 9,455 in the 1935 period.

The company said that as of June 30 there were 1,179,275 telephones in service in the state.

Construction

ALEDO, ILL.—The Western Illinois Telephone Co. is installing an additional section of switchboard and making other improvements in the central office equipment.

ALPHA, ILL.—Aerial cables of the Alpha Mutual Telephone Co. will be replaced with underground cable.

MORRISON, ILL.—The Morrison Telephone Co. will move its switchboard to the second floor of the present building, with a restroom and kitchenette provided on the same floor. The room on the first floor now used for an operating room will be used for a commercial office. A large warehouse is being constructed in the rear of the exchange building.

LITTLEFIELD, TEXAS—Subscribers of the Southwestern Associated Telephone Co. having signed up unanimously in favor of the common battery system, C. R. Hurmence, commercial superintendent, announced recently that plans had been prepared for a new modern fireproof brick building to house the new telephone system and offices.

Obituary

ST. MARYS, KANS.—Frank Alff, 32, traveling lineman for the Southwestern Bell Telephone Co., came in contact with a power line June 30 while at work near here and was killed. Fellow workmen released his safety belt and lowered him to the ground from the pole on which he was at work. His home was in Kansas City.